CHALMERS
UNIVERSITY OF TECHNOLOGY

The role of project director and its needed competencies

A study on large infrastructure projects in Sweden

Master's Thesis in the Master's Programme Design and Construction Project Management

HENRIK MADSEN
PONTUS PYYKKÖ

Department of Architecture and Civil Engineering
Division of Construction Management
CHALMERS UNIVERSITY OF TECHNOLOGY
Master's Thesis BOMX02-17-58
Gothenburg, Sweden 2017

MASTER'S THESIS BOMX02-17-58

The role of project director and its needed competencies

A study on large infrastructure projects in Sweden

Master's Thesis in the Master's Programme Design and Construction Project Management

HENRIK MADSEN

PONTUS PYYKKÖ

Department of Civil and Environmental Engineering

Division of Construction Management

CHALMERS UNIVERSITY OF TECHNOLOGY

Göteborg, Sweden 2017

The role of project director and its needed competencies
A study on large infrastructure projects in Sweden

Master's Thesis in the Master's Programme Design and Construction Project Management

HENRIK MADSEN

PONTUS PYYKKÖ

Examensarbete BOMX02-17-58/ Institutionen för arkitektur och samhällsbyggnadsteknik,
Chalmers tekniska högskola 2017

Department of Civil and Environmental Engineering
Division of Construction Management
Chalmers University of Technology
SE-412 96 Göteborg
Sweden
Telephone: + 46 (0)31-772 1000

Department of Architecture and Civil Engineering, Göteborg, Sweden, 2017

The role of project director and its needed competencies

A study on large infrastructure projects in Sweden

Master's thesis in the Master's Programme Design and Construction Project Management

HENRIK MADSEN
PONTUS PYYKKÖ
Department of Architecture and Civil Engineering
Division of Construction Management
Chalmers University of Technology

ABSTRACT

The Swedish construction industry faces a current construction boom with several large infrastructure projects being executed, especially in the urban areas around the larger cities. There is an on-going trend where the projects become larger and larger, which also complies with international trends where the projects are even larger. Earlier research describes site managers as problem-solvers that muddle through their working-tasks reactively, and consider administration as an extra workload that impedes their possibility to lead the production. The role of the project director can be described as a role that mainly focuses on work with strategic management, coordination and much administration, and due to large financial risks, the project director needs a proactively way of working.

Through a qualitative research, the authors have conducted an abductive literature review of construction project characteristics, organizational structures, project management, and the role of the site manager. Furthermore, an interview study was conducted with seven project directors representing the contractor, and two project director representatives from the Swedish Transport Administration. The study aimed to investigate and discuss the possibility to appoint a project director without the traditional career path, and thereby not having the traditional production-related working life experience.

The study indicated that there are differences in how project directors perceive themselves and their working tasks compared to the traditional site manager. By natural causes, there are great similarities since the two professions are different sides of the same coin. However, a project director should, and must emphasize strategic and organization management in greater extent than a traditional site manager. The study showed that there is a possibility to appoint a project director without the traditional background, although it is considered to be a necessity to have a general understanding and knowledge about the processes in the construction industry. An appointment of a "non-traditional" project director will however lead to some adjustments of the organization structure, and would require a project organization with high degree of knowledge and experience in other key roles, as well as decentralized decision-making.

Key words: Project director, project organization, project manager, site manager, construction manager, competence, attribute, large infrastructure projects

Projektchefens roll och dess behövda kompetenser
En studie på stora infrastrukturprojekt

Examensarbete inom masterprogrammet Design and Construction Project Management

HENRIK MADSEN
PONTUS PYYKKÖ
Institutionen för bygg- och miljöteknik
Avdelningen för Construction Management
Chalmers tekniska högskola

SAMMANFATTNING

I Sverige råder det idag en högkonjunktur inom byggbranschen med flera stora pågående och planerade infrastrukturprojekt, speciellt i stadsmiljöer vid de större städerna. Trenden i Sverige är att projekten blir större och större vilket sammanfaller med internationella mått, där projekten är ännu större. Tidigare forskning beskriver platschefen som en problemlösare som reaktivt tar sig igenom arbetsdagen och anser administration som en extra arbetsbelastning som hämmar möjligheter att leda produktionen. Projektchefens roll kan beskrivas som en roll som i huvudsak fokuserar på strategisk ledning, koordinering och mycket administrativa arbetsuppgifter, och på grund på de stora ekonomiska riskerna måste projektchefen arbeta proaktivt.

Genom en kvalitativ forskningsansats har författarna genomfört en abduktiv litteraturstudie inom byggprojekts specifika egenskaper, organisationsteori, samt projektledarens och platschefens roller. Ytterligare har en intervjustudie med sju entreprenörsprojektchefer och två projektchefer från Trafikverket genomförts. Studiens syfte är att undersöka och diskutera möjligheten att tillsätta en projektchef som inte har gått den traditionella karriärvägen och därmed saknar den traditionella produktionserfarenheten.

Studien visar på att det finns skillnader på hur projektchefer ser på sig själva och deras arbetsuppgifter jämfört med den traditionella platschefen. Av naturliga skäl finns det stora likheter i båda rollerna, men man kan se de två olika yrkena som olika sidor av samma mynt. En projektchef bör och måste lägga mer tyngd på strategiskt arbete och organisationsfrågor jämfört med den traditionella platschefen. Produktionskunskap är nödvändigtvis inte ett behov för en projektchef, men rollen kräver en övergripande förståelse och kunskap om byggbranschen och dess processer. Att tillsätta en projektchef som inte har den traditionella bakgrunden skulle innebära vissa justeringar av projektorganisation och kräva en projektorganisation med stor kunskap och erfarenhet belägen i andra nyckelroller, såväl som ett mer decentraliserat beslutsfattande.

Nyckelord: Projektchef, projektorganisation, projektledare, platschef, kompetens, egenskaper, stora infrastrukturprojekt

Contents

Preface

This master thesis was conducted from January to June 2017 at the Division of Construction Management at the Department of Architecture and Civil Engineering at Chalmers University of Technology.

We would like to thank our supervisor Martin Löwstedt, who has helped us with limiting the scope of the master thesis and providing us with support, innovative ideas and helpful feedback throughout the entire process. Furthermore, we would like to thank Per-Ola Svahn, our contact person at Skanska Sverige AB, for his advices and help of creating connections with relevant people to interview.

Moreover, we would like to thank all our interviewees for taking the time to be a part of our research, and contributing with their knowledge and experience.

Göteborg, June 2017

Henrik Madsen and Pontus Pyykkö

1 INTRODUCTION

This chapter provides a background to the current infrastructure situation in Sweden and how the development will look like in the near future. Furthermore, the chapter actualizes the lack of site managers, the usual career paths and experience of project directors, and how the role of the project director might transform due to the increasing size of infrastructure projects in Sweden.

1.1 Background

Because of the urbanization, Sweden is facing a future of larger infrastructure construction projects, especially within and around the areas of larger cities (Kungl. Ingenjörsvetenskapsakademien (IVA), 2016). Examples of such projects are for instance Västlänken, Hisingsbron, and Marieholmstunneln, which all are located within the central areas of Gothenburg. These projects' budgets have increased significantly, and therefore also the risk of the projects have risen simultaneously. At the same time, organizations have streamlined their organizations in a wider range than before. Instead of having all the competence within the organization, consultants are rather hired (Szentes & Eriksson, 2013). Therefore, single corporations will face a future with larger and larger infrastructure projects that puts pressure on having the right competencies in the organization and the economical muscles for developing these large-scale construction projects (Hong & Chan, 2014). The trend of growing project organizations is assumed to continue and will put increased demands on the management of these projects.

The development of the Swedish infrastructure will be executed simultaneously as there is a shortage of new buildings in quantities of tens of thousands that are planned to be built. According to Byggcheferna (2015), there is a shortage of site managers in the Swedish construction industry. In Sweden, the utmost manager in a large infrastructure project is often referred to as project director and the common career path for the people that are appointed as project directors is that a major majority of them have a background of working at the contractor in production-related roles. A general simplification of the professional career path usually contains roles as supervisor, site manager, production manager, before being appointed as a project director. However, because of the lack of site managers, alternative backgrounds might need to be considered in order to appoint project directors in the future. Furthermore, the success of a large infrastructure project is often described as being dependent on the project director's role of the project. Despite the importance of the role, present literature is rather vague regarding project directors in large infrastructure projects, focus is rather on Mega projects in general. Therefore, this master thesis will put emphasis on breaking down what a project director actually is doing, and what competences that are needed for the role.

The master thesis will also question why the construction industry puts so much trust in experience when appointing a project director. In the Swedish construction industry, co-workers, sub-ordinates and the site managers themselves place great importance of having production-related experience and knowledge. However, despite the potential benefits of having a project director with lots of production-related experience, it can be argued if that person is the right person suited for shouldering the role as a project director in a large infrastructure project. The question is if the

production experience is of the same importance in large projects or if the role of the project director transforms into focusing on other work tasks such as management, coordination and leadership in greater scale, and thereby should the experience/knowledge be situated on other roles within the project organization in a large infrastructure project?

1.2 Purpose

The study aims to examine, problematize and discuss the possibility to appoint a person without the traditional career path and production-related experience into a position as a project director in a large infrastructure project.

1.3 Research Questions

To facilitate for achieving the purpose, one main question has been formulated to evaluate the role of the project director:

- Can a project manager without production experience shoulder the responsibility as a project director in a large infrastructure project?

In order to break down the main research question into applicable data, three additional research questions have been developed to find relevant connections or disconnections between the theoretical framework and the conducted interview study:

- What is a project director's main working tasks and how do they perceive themselves?
- How does the project director role differentiate from the site manager role?
- What implications for the project organization would a non-traditional project director imply?

2 THEORETICAL FRAMEWORK

In order to receive an understanding for the everyday life of a project director, it is first necessary to describe typical characteristics related to the construction industry, which affect how a large infrastructure project is executed. First, an introduction of some of the most important project basics will be presented, and how these basics are related to construction projects. Then, the organization structure and how it affects decision-making and communication within a construction organization will be considered. Furthermore, general project management and the role of the project manager will be addressed, and finally, the role of the site manager and what skills that are needed for the role are discussed. The literature review aims to present several aspects that are important in order to get an overview of the construction industry, and foremost, for how to manage a large infrastructure project. The theoretical framework will work as a basis to support the discussion and concluding remarks of this master thesis.

2.1 Project basics – Definition of a project and its characteristics

Seymour & Hussein (2014) state that projects have been present in the human society since antiquity. Despite challenging conditions due to complexities and uncertainties, the history encompasses lots of successful projects that have been completed; The Great Wall of China, the great Pyramid of Giza, the Coliseum and the Stonehenge are all remarkable projects. All these projects required a large amount of workforce, large scope, high-end planning and accurate execution, and were performed during a long period. Despite the fact that these projects still are present today, there is a scarce documentation of how they were performed regarding what methods and techniques that were used. However, one can undoubtedly argue that these monuments are proof of the strengths of the performance of projects, and that projects facilitate for organizations and corporations to increase their capabilities of coordinating, controlling, and implementing actions in order to improve the efficiency in terms of people and resources, which in turn contributes to flexibility and decreased risks.

The construction industry is a project-based industry and is often described as an uncertain and complex environment with several of stakeholders involved throughout the entire lifecycle of a project (Chan et al, 2004; Szentes & Eriksson, 2013). In order to break down the complexity of the nature of today's construction industry, it is necessary to first define its most basic component; what is a project?

Previous research encompasses plenty of suggestions for how to define a project. According to Bentley (2009), a project is defined as *"…a temporary organization created for the purpose of delivering one or more business products according to an agreed Business Case"*. Furthermore, the author points out that there are five major characteristics in a project; Change, Uncertainty, Temporary, Unique, and Cross-functional, see Table 2.1 below.

Table 2.1 A brief description of the five major characteristics in a project (Bentley, 2009).

Characteristics	Description
Change	The purpose of the implementation of projects is to cause change to a business.
Uncertainty	Because of changes that occur during a project, and unknown future events, a project is heavily affected by uncertainty.
Temporary	One exclusive project team is put together for the work task, finishes the job, and then moves on to new projects.
Unique	Although there are similarities and repetitive work, all projects are unique; different location, different people, variations in scope etc.
Cross-functional	Employees with diverse skills and backgrounds are often needed in projects. Most often the employees have different line managers or even come from different companies.

Another definition presented by Project Management Institute (2013, p.3) is that *"A project is a temporary endeavour undertaken to create a unique product, service, or result"*. In addition, a project consists of limited amount of time with a definite beginning and end. Although a project is of temporary nature does not automatically mean that the time for the project is short, on the contrary, a project may extend over a long time. Furthermore, as stated in Table 1, all projects are considered to be unique despite repetitive activities. The uniqueness of the result often derives from uncertainty and inexperience. Examples of projects are development of new products or services, research projects, and construction of a building or infrastructure (Ó Conchúir, 2012; Project Management Institute, 2013).

2.1.1 Defining project success

The main purpose of applying a project is to delegate responsibility and power in order to reach the given objectives (Saladis & Kerzner, 2009). However, to decide whether a project is considered to be successful or not is a process that varies from project to project. As stated by (Saladis & Kerzner, 2009), there is a wide variation of what project success is and there are no universal criteria that fit all projects. Despite the multifaceted criteria, the Triple Constraint Triangle is most likely the most frequently used model when deciding on project success. The triangle in Figure 2.1 displays three important factors that often are considered: time, cost and scope/quality.

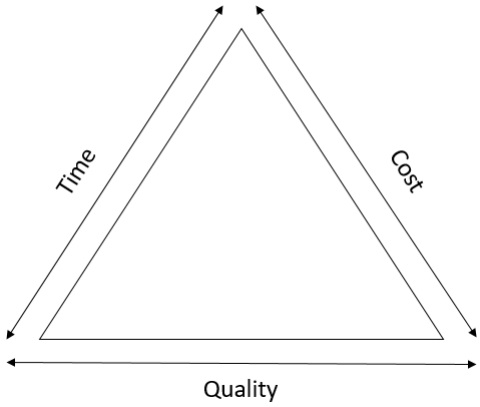

Figure 2.1 A visualisation of the Triple Constraints Triangle model.

Saladis & Kerzner (2009) point out that understanding how these factors are related, where one change in the triangle will directly or indirectly have impact on the other sides, is key for managing projects. However, even when understanding the relationship of the Triple Constraint Triangle it is still a tough challenge to manage construction projects in order to be successful since projects often are characterized by being complex, large-scaled with a lot of involved stakeholders, held back by authorities and legislation, and often strongly influenced by uncertainty and tight deadlines (Favié & Maas, 2008). According to Szentes & Eriksson (2014), various competences are needed for succeeding with project management and the authors suggest that the competences needed today are different than the ones needed earlier. The conditions for large construction projects have changed; therefore also the formation of the management team needs to be formed differently.

Since this Master's thesis focuses on large infrastructure projects, next section will bring some clearer understanding of how construction projects have changed over time, what a large infrastructure project is and its typical characteristic.

2.2 Construction project

All projects face challenges that derive from the five major characteristics in a project that was presented in previous section, construction projects are no exceptions. However, construction projects are unique in their nature, hence specific challenges that characterizes construction projects will be discussed. It should be mentioned that *change* is considered to be of general character and will not be further discussed.

2.2.1 The relationship with the client

Almost all projects consist of a cross-functional project team that needs to collaborate to strive towards a common goal. However, in the construction industry the cross-functional project is not limited to the own organization, it spans over two organizations. The contractor has its counterpart, the client, which the contractor need to collaborate with closely in order to accomplish a successful construction project.

Yu et al (2006) point out that in a construction project it is paramount as a contractor to identify and understand the actual needs and requirements of the client. However, it is not enough to just understand, it is also necessary to transfer this understanding to

actual performance, and to assure that everyone throughout the organization and the project team share this view. Due to the complexity in construction projects, and the amount of involved parts, this can sometimes be quite challenging, and a lot of information is shared, and possibilities are that some of this information is 'lost in translation' between all the involved parts; the client, the contractor, sub-contractors etc. This can be especially challenging when the client is inexperienced, which puts even more pressure on the contractor to understand what the client wants (Yu et al, 2006).

Despite the importance of the collaboration between the client and the contractor, Bryde & Robinson (2005) mean that the collaboration often is inadequate. Furthermore, the authors highlight the largest obstacle being the different self-interests of both parts. The contractor has a tendency to put emphasis on minimizing costs and project duration, while the client puts more effort on fulfilling the needs of the stakeholders. The authors mean that a more transparent collaboration with joint objectives would favour both parts, with a more successful project as an outcome. This type of collaboration is quite unique for a construction project.

2.2.2 Not a typical 'inside four walls' industry - a project of temporary nature

"The physical substance of a house is a pile of materials assembled from widely scattered sources. They undergo different kinds and degrees of processing in large numbers of places, require many types of handling over periods that vary greatly in length, and use the services of a multitude of people organized into many different sorts of business entity" (Cox & Goodman, 1956, p.36).

In comparison to other industries, a construction project is highly unique and depending on lots of involved actors. The quote above, stated by Cox & Goodman (1956), indicates that a construction project is dependent on a lot of different materials, processes, and especially encompasses a large variety of actors. Dubois & Gadde (2002) describe that even one single product, for instance a house, can consist of endless combinations of specific places and entities. While other industries produce specific products in large repetitive batches, the construction industry is influenced by the uniqueness to a larger extent. As a project manager in the manufacturing industry, all processes are perfectly estimated and related to each other, with a less degree of uncertainty. Unlike other industries, the construction industry is not standardized to the same extent, and because of that, a construction project is heavy influenced by decentralized decision-making from the main organization.

Moreover, the construction industry is a site-specific project-based activity that mainly is about coordinating specialized and differentiated tasks on site (Cox & Thompson, 1997; Shirazi et al, 1996). In comparison to the standardized manufacturing industry, a new construction project means a complete new location, a new organization, and entire new conditions. Despite that some activities and processes are similar and repetitive to some extent, one must rely more on problem-solving on site because a new location means dealing with constant uncertainty, especially regarding ground conditions.

In a construction project, the organization is of temporary nature where an organization is created and team members for the specific project are assigned. Everything evolve around the location and the unique product that is about to be built. In the manufacturing industry, the production is located inside a building surrounded by four walls. The organization as a whole is rather consistent, as well as the processes, even though they vary depending on which product that is to be produced. Dubois & Gadde (2002) describe the construction industry as a loosely coupled system relying on key roles. Because of the restricted time available with tight final deadlines, a construction project requires key roles with more skills for designing the organization and managing the project towards a common goal compared to other industries with more rigid organizations that last over a longer time.

2.2.3 The sources of complexity in a construction project

> *"The continuous demands for speed in construction, cost and quality control, safety in the work place and avoidance of disputes, together with technological advances, economic liberalization and globalization, environmental issues and fragmentation of the construction industry have resulted in a spiral and rapid increase in the complexity of construction processes." (Gidado 1996, p.214)*

According to Gidado (1996), a construction project is characterized by the complexity deriving from four main sources; managing resources employed, the environmental location, the scientific knowledge needed, and the interaction of diverged parts involved in the workflow. Furthermore, the author continues to explain that the complexity of these main sources originates from uncertainty and interdependence. The uncertainty causes challenges in working proactively with managing what resources that are needed for the project, what special competence that is required, and how work tasks should be preformed. Summarized, the uncertainty causes lack of exact instructions for the project, which hampers centralized proactive strategic management from the main organization, and puts pressure on decentralized problem-solving/decision-making for the on-site management. This is an example of the uniqueness of a construction project.

The interdependency derives from the complexity of gathering the different involved parts together to shape a workflow, and is directly related to the operational production. Gidado (1996) presents three factors that are considered as challenges; the amount of technologies and specialists that are interdependent, the rigidity of sequence between the various main operations, and the overlap of stages, elements and activities of construction. Furthermore, the author states that these challenges put pressure on how to structure the organization, coordination of internal and external workforce, communication paths, and for how to plan the project.

2.2.4 Plan to have issues planning

In order to accomplish a successful construction project, planning is paramount for the contractor. According to Gidado (1996), the construction industry is lacking of proper tools to evaluate the complexity of construction projects, which in turn

hampers the abilities of planning. Unlike other industries, it is hard to plan a construction project in detail because of the high degree of uncertainty, and all the interrelated activities. It is more common to use milestones to ensure that the production keeps up with the time schedule of the project. Furthermore, the author states that the construction industry has not adopted to the use of estimated standard times for activities in the same extent as other industries. Instead, the more conventional trial and error approach is often used, which is highly dependent on experience, and in the long run can be vulnerable for organizations as all key roles might not have the proper experience when facing new unexpected challenges. Table 2.2 displays a summary of the main challenges of planning a construction project.

Table 2.2 The underlying reasons for the major challenges in construction projects (Gidado, 1996).

Major challenges related to planning based on the research of Gidado (1996):
The large amount of diverse systems that has to be put together and the large amount of interfaces between elements.
The involvement of construction work on a restricted construction site with access difficulty and requirements of many trades to work in close proximity at the same time.
The great deal of intricacy, which makes it hard to specify exact how to reach a desired goal as well as how long time it will take.
The lack of clear instructions and a lot of details for how a project should be executed.
The difficulty of continuously performing efficient coordinating, control, and monitoring the project throughout the entire life-cycle, from start to finish.
The encompassment of all revisions that are hard to manage due to the interrelation between all activities being performed.

As shown in Table 2.2, there are several explanations why these risks appears. The location and surrounding environment, the cross-functional project team, and the constant uncertainty and lack of detailed instructions are all though challenges that need to be managed for a successful project outcome.

2.2.5 Transformation over time - a new set of requirements

According to the present literature, the construction industry is often described as being conservative and not easy to change (Nam & Tatum, 1997). However, when the projects have rapidly been growing in size and complexity, there have occurred some distinct changes that derive from societal changes. Chan et al (2004) state that the nature of the construction industry is dynamic because of increasing uncertainties regarding technology, budgets, and development processes. Furthermore, the authors claim that the uncertainty has contributed to the transformation of the construction industry, which nowadays encompasses a larger amount of more complex and challenging projects than before. This recent, and on-going, development has not only put even more pressure on how to manage today's construction projects, but also set new requirements for what competences that are needed in order to cope with unprecedented changes. Current literature on the topic present several transformations that have influenced the industry. For instance, Szentes & Eriksson (2013) present several existing developments that they mean also have transformed the demands for how organizations and the site management manage their daily businesses.

In line with the general perception that large construction projects are larger today, both the variation and amount of internal and external stakeholders that need to be managed has increased (Szentes & Eriksson, 2013). One example of the growth of internal stakeholders is that organizations tend to streamline their own organizations in a wider range than before. Instead of having all the competence within the organization, consultants are rather hired in order to ensure that the most suitable person is assigned for the task. Furthermore, the authors point out that the more frequent use of matrix organization that are achieved by taking these actions has not only contributed to that more roles are included in a project, but also to an increase of the amount of involved companies. This in turn leads to challenges to get all involved personnel to work towards the objectives of the project as the consultants often focus more on their own objectives of the specific subproject.

Because of the urbanization, many construction projects are located within urban areas and have clear impacts on the society. In section "*2.2.4 Plan to have issues planning*", one of the major challenges for planning a construction project is the involvement of construction work on a restricted construction site with access difficulty and requirements of many trades to work in close proximity at the same time. The trends towards more urban located projects makes it even more challenging to plan construction projects due to limited construction site in urban areas, restricted surfaces for storing material, and increasing demands on just-in-time deliveries and how to plan transports in dense cities. In addition, indications are that the public has become more informed, educated and interested in construction projects and how projects impact society. Even though the objectives of a project do not consider specific demands from the public, these stakeholders need to be considered and managed, which, according to Szentes & Eriksson (2013) has lead to an increased importance of communication skills. Moreover, as labour with several foreign backgrounds is more common today, multiple language skills are often needed.

Another aspect that Szentes & Eriksson (2013) touch upon is the technological development. The entrance of industrialized construction such as the use of prefabricated construction elements has changed how onsite production processes are performed. This implementation has forced the industry to create and establish new standardized ways of performing specific work tasks. This development contributes to less need of decentralized decision-making on site as discussed in "*2.2.2 Not a typical 'inside four walls' industry – a project of temporary nature"*. However, compared to other industries the amount of standardized processes is very low, and Dubois & Gadde (2002) argue that problem-solving on site still is crucial for succeeding to accomplish successful construction projects. At the same time, information technology has grown a larger influence on the daily practices. Not only has BIM entered the industry, a variety of IT-solutions and tools, project document databases, and internet/intranets are used on a daily basis, which facilitates for planning, communicating and visualizing work activities (Szentes & Eriksson, 2013).

Furthermore, Szentes & Eriksson (2013) argue that construction activities are more dependent on political decisions than before. It is usually difficult to forecast these decisions in terms of time and content, which makes the planning of a project hard because the final date of a project often is determined beforehand. The outcome of this is that the production phase in a project often suffers from less amount of time available, which in turn leads to a high production pace. The political influence

complicates the production phase and puts pressure on the contractor to be finished within the predetermined timeframe. In the section "*2.2.1 The relationship with the client*" Bryde & Robinson (2005) argue that the contractor's and the client's self-interests hamper the collaboration at large. This is one example of when the contractor would benefit from understanding the client's role, and that the client is dependent on several decisions by authorities. It would not only create a more positive atmosphere, above all it would facilitate for planning the production schedule.

2.3 Organizational structure – a precondition for succeeding as project director

An organizational structure is a system that outlines how work roles and responsibilities are delegated, controlled and coordinated within an organization (Pugh, 1984). The organizational structure is adopted in order to display the hierarchical arrangement of authority, communication rights, and information flows between different levels of management. Furthermore, this section aims to present factors that affect the organization structure in construction projects, how to deal with centralized vs decentralized decision-making, and how to develop organization charts, which all are important aspects a project director need to consider.

2.3.1 The need of creating an organization chart

As mentioned in the section "*2.1 Project basics - Definition of project and its characteristics*", a project is temporary, unique and often challenging. In addition, it is highlighted by El-Sayegh et al (2016) that construction projects are even more challenging because of the involvement of several parts such as the client, the contractor, sub-contractors etc. Furthermore, the management of construction projects demands coordination of a large amount of people. In order for this coordination to be performed adequately, an application of a well-designed temporary project organization structure that will last throughout the entire project is vital to ensure project success. The organisation chart, a diagram that visualizes the organization structure, should include information regarding hierarchical relationships between the project manager and project team members. When creating the organization chart, managers need to reflect upon the delegation of authority, see upcoming section "*2.3.4 Centralized vs decentralized decision-making*". The aim of the organization structure is to distribute responsibilities as well as encourage interaction to favour cooperation among individual teams within the organization in order to structure project activities and achieve the project objectives (El-Sayegh et al, 2016).

2.3.2 Factors affecting the organization structure in construction projects

El-Sayegh et al (2016) present several factors that are crucial for structuring an organisation. The authors have divided these factors in four categories; Project factors, Company factors, Stakeholders' factors, and Environment factors, all presented accordingly.

Project factors encompass the following factors; project size, complexity, uniqueness, and importance. As projects are increasing in size, the organization structure tends to

get more complicated. Constructing a small storage house can easily be achieved with a simple organization structure, while a more complex skyscraper project requires a more complex structure. In fact, when a project is tiny, there is no thing like an organization structure; tasks are performed and decisions are based on the experience of the individuals. In addition, if a project consists of several unique activities the organization structure gravitates towards a more decentralized structure. Furthermore, when a project is particularly important in terms of financial aspects, the authors highlight the significance of developing a proper organization structure (El-Sayegh et al, 2016).

Company factors include availability of staff, available technology, market strategy and desired level of control. According to El-Sayegh et al (2016), technological development heavily influences the design of structure as the development has resulted in new insights regarding additional/specialized roles needed in the organization. In general, new businesses often have simple organization structures, while an established company tend to have a more complex organization structure. El-Sayegh et al (2016) state that this tendency is an effect of the development of a company since taking on more complex projects requires more specialized staff.

Stakeholders' factors consist of owner's requirements, skills of staff, internal power and external power. Adjustments of the organization during construction projects are common and depending on what competence that is needed where in the process. Additionally, El-Sayegh et al (2016) stress that the client set the tone of the project. New requirements by the client will directly or indirectly affect the design of the organization. Furthermore, diverse skills of the staff are needed to gain flexibility, but it also affects the structure of the organization. Or more precisely, it affects the management of the organization structure, and especially how to deal with internal and external delegation of power in decision-making. If some employees in a project have more power concerning decision-making than others, chances are that the organization will be centralized.

Environment factors contain location, stability of the external environment, financial uncertainty and technological uncertainty. If a project is situated far away from the head office this will influence the design of the organization structure, hence a larger organization is required. The authors point out that the structure of the organization is highly dependent on the external environmental conditions, discussed in section "*2.2.2 Not a typical 'inside four walls' industry – a project of temporary nature*". If the external environment is stable, the organization is rather fixed, and vice versa. When the financial uncertainty is present, the shape and size of the project is affected, and the organization tends to be rather flat. Summarized, El-Sayegh et al (2016) mean that the design of an organization is dependent on several factors and if these factors are clearly defined and stable, the organization is rigid because there are no needs for a complex organization, while the organization lean towards being more complicated when the uncertainty is present since constantly changes will affect the organization structure.

2.3.3 A constantly uncertain market – how to proactively work with changes

Forecasting the future market and fluctuations in demand is challenging for all corporations. However, at the same time it is crucial in order to stay competitive (Bøllingtoft et al, 2009). As pointed out in the section *"2.2.2 Not a typical 'inside four walls' industry – a project of temporary nature"*, the construction industry is a site-specific project-based activity, which is heavily influenced by a high degree of uncertainty such as uncertain ground conditions, future events, and weather conditions; hence, changes are a reoccurring ingredient on construction sites because of the uncertainty. According to Bøllingtoft et al (2009), one way to approach this issue is to optimize the organisation structure in order for the organisation to enhance its abilities to adapt dynamically, and to secure a proper balance between the environmental conditions and organizational characteristics to steer in the right direction of the changing market. Furthermore, the authors state that by reallocating and managing resources, firms can take advantage of business opportunities more preferably, which facilitates for strategic decision-making (Bøllingtoft et al, 2009). In their article, the authors especially pinpoint one approach for how to structure organizations that has been successful regarding adapting to increased market turbulence, both for companies in the oil industry as well as the apparel manufacturer industry. The studied corporations implemented a vertical disintegration and an extensive decentralization to receive more capability to deal with future business opportunities caused by an uncertain market. By taking these actions, the SBU (strategic business unit) managers had less organizational restrictions and were delegated decision rights to greater extent. However, the increased entitlement for the SBU managers within the organizational structure required more coordination, especially across the SBU managers.

The focal point of what is presented by Bøllingtoft et al (2009) is a guiding principle for how to design an organization, and the authors refer to this principle as the four organizational trade-offs; specialization, interdependencies, delegation, and incentives. Specialization and interdependencies are described as task-related mechanisms, while delegation and incentives rather focus on people-related mechanisms. Accordingly, all these aspects are crucial when structuring an organisation and should carefully be considered and analysed. Balancing the four organizational trade-offs is necessary for creating and sustaining dynamic capabilities, especially for disintegrated permeable firms. Finally, the authors point out that an organisation's adaptive capacity comes at the expense of increased complexity regarding coordination and integration (Bøllingtoft et al, 2009).

2.3.4 Centralized versus decentralized decision-making

In the section *"2.2.3 The sources of complexity in a construction project"*, Gidado (1996) addresses the underlying reasons for complexity in a construction project. The author states that there are several explanations for the complexity, but summarizes the main challenges as consequences of interrelated activities that require specialized skills and management of the diverse resources. Bøllingtoft et al (2009) highlight specialization as one of four trade-offs that needs to be balanced when structuring an organisation. Furthermore, it is emphasized that specialization improves an organisation's opportunities to foresee changes on a market when decision rights are

delegated as a specialist is focused to work within his/her specialist field and therefore can take right decisions in greater occurrence. However, the drawback of specialization is that it requires increased internal coordination by feedback (Bøllingtoft et al, 2009). Jensen & Meckling (1992) also stress this issue. The scholars put emphasis on how to deal with decision-making in relation to knowledge, and argue that *"...an organization's performance depends on the collocation of decision-making authority with the knowledge important to those decisions"* (Jensen & Meckling, 1992, p.2). In order to assure that specific knowledge will be prioritized in decision-making, decentralization is somehow needed. However, the delegation of decision rights will highlight two main issues for organisations: First, deciding who is going to have the decision right, and second, how to control that the decisions conform with the objective of the organisation.

Concerning decision-making, it is beneficial to combine the decision right with the knowledge relevant for the decision. Jensen & Meckling (1992) state that there are two ways of doing so; either the information is transferred to the person with the decision right, or the decision right is delegated to the person with the information. Furthermore, it is highlighted by the authors that it is often not enough to just delegate decision rights. All individuals within an organisation are self-interested in various degrees, and it must therefore be controlled that personal objectives not are in conflict with the objectives of the organisation. These conflicts of interest are referred to as *The Agency Problem* and are often derived from delegation of decision rights. In order to assure that the person given the decision right takes decisions that are in the best interest of the organisation as a whole, the top management must implement a control system that foster desirable behaviour (Jensen & Meckling, 1992).

Delegating decision rights to division managers in an organization puts pressure on the coordination and communication abilities of the organization. One question that is discussed by Alonso et al (2008) is whether a centralized or decentralized organization is the optimal way to deal with communication and coordination. As presented in section *"2.2.2 Not a typical 'inside four walls' industry – a project of temporary nature"*, the construction industry is not as standardized as other industries, and almost solely relies on instant problem-solving on site. In order for this to work, Dubois & Gadde (2002) argue that decentralized decision-making is necessary. Alonso et al (2008) agree and argue that decentralization is to prefer even when coordination is paramount and present two main arguments. The first argument is that delegation of decision rights to those concerned is necessary in order to achieve efficient decision-making to ensure that relevant information will be considered. The second argument is that local knowledge will supply division managers with essential information, which benefits for them to perform their work duties, and simultaneously the top management can focus on being an efficient aggregator of spread out information to gain communication advantages.

In each organization, the top management role faces the problems discussed above. Chances are that the project director has the most relevant knowledge for dealing with strategic challenges in a construction project. However, concerning decision-making it is paramount to delegate decision rights to key roles within the organisation. It is not simply possible for the project director to gather all necessary information to be involved in each and every detailed decision (Jensen & Meckling, 1992).

2.3.5 Communication chart – a direct consequence of the organization structure

In accordance with Martin et al (2014), one consequence of the organization structure is how to deal with communication. The authors discuss that construction managers struggle with losing control of their projects due to poor communication, and they mean that the structure of the organization directly affects the communication flow within the organization. However, as highlighted in *"2.2.1 The relationship with the client"*, it is important to not limit the communication chart to the own organization, the communication chart should also include how to communicate and collaborate with the client. In order to deal with these issues several suggestions are presented in their article, since they argue that establishing good communication channels is key when designing the structure of the organization.

The construction industry is heavily influenced by disputes and claims, which often derive from poor communication between the involved parts. In order to solve this situation, it is necessary to reduce uncertainty regarding the involved roles, as well as to state clear responsibilities and instructions for how to perform work activities. Martin et al (2014) mean that all barriers that create misunderstandings due to unclear responsibilities etc. must be removed. By implementing clear, concise, accurate, and well-planned ways of communicating, this will be achieved. A well-organized communication chart is not only a pre-condition for good communication, but is also paramount for project success. The way an organization is structured affects how co-workers interact with each other, which in turn indicates for how the communication chart should be designed, and what communication levels that should be included. The authors point out that the communication channels should be established in the beginning of the project and should conform with the contract. The purpose of the communication channels is to reduce barriers, which in the end will facilitate for effective communication, and enable for accurate decision-making since the projects participants will be correctly informed. Finally, Martin et al (2014) advocate that an decentralized organization structure is preferred since it has less communication resistance compared to a centralized organization. In addition, a decentralized organization structure also promotes individual empowerment and efficient decision-making. However, the question is how large an organization can grow before some extent of centralization is needed.

2.4 Project Manager

PMI (Project Management Institute) is an organisation that was founded in 1969 and has developed the PMBOK (Project Management Book of Knowledge), which is widely used and distributed around the world. The definition according to PMBOK fifth edition is following (Project Management Institute, 2013, p.5):

> *"Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the 47 logically grouped project management processes, which are categorized into five Process Groups. These five Process Groups are: initiating, planning, executing, monitoring and controlling and closing."*

2.4.1 Management processes

The reason why project management has been developed during the history is to better organize, and thereby achieve project success. The PMBOK recommends that project teams:

- Select appropriate processes required to meet the project objectives
- Use a defined approach that can be adapted to meet requirements
- Establish and maintain appropriate communication and engagements with stakeholders
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing constraints of scope, schedule, budget, quality resources, and risk to produce the specified product, service, or result

The above-mentioned processes are performed together with stakeholders by the project team and they can normally be divided in two categories:

- Project management process
- Product-oriented processes

Project management processes are processes connected to ensure efficient flow of the project life cycle. *Product-oriented processes* are related to the creation specification of the project's product. These processes vary, depending on industry the project is related to and they are important. In order to define the scope of the project, the project manager/project team needs basic understanding of these.

PMI further categorize the project management processes into five groups; see Figure 2.2 below. The processes do not stand-alone; they are rather integrated in each other in terms of interactions as well as the objective of the process. The process groups are following:

- Initiating process group
- Planning process group
- Executing process group
- Monitor and controlling process group
- Closing process group

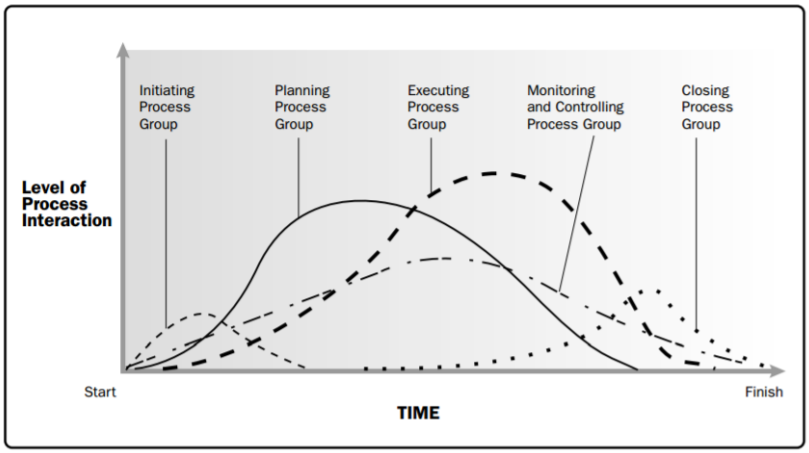

Figure 2.2 The interaction between process groups (Project Management Institute, 2013)

2.4.2 What is a project manager?

According to Turner & Müller (2003), the project manager can be described as the chief executive of a temporary organization. Furthermore, the authors point out that *"...the project manager as chief executive sees their role as one of formulating objectives and strategy for the project, and through the purpose of the project, linking those objectives and strategy to the objectives and strategy of the parent organization"* (Turner & Müller, 2003, p.5). The quality of the project manager is continuously tested regarding uncertainties, crisis and suspensions that occur in the project and the project organization. Usually project managers have a large and diverse group to manage in order to get things done even though they do not have direct control of the majority of them. Furthermore, this section aims to provide information regarding the general project manager and what skills the role require.

2.4.3 The role of the project manager

The role of the project manager is to lead and manage the project as well as the project team, and in its extension, manage the outcome of the project. Work tasks related to the project manager vary in a broad spectrum and are naturally depending on the industry where the project manager is operative within. In accordance with Turner & Müller (2003), the importance of the role rather lies with setting objectives and motivating the project team to strive towards these, instead of planning and actually executing work. *"The project manager should learn to delegate the planning and reporting, and most of the work. The manager's role is further to interpret the plans and progress reports, to interpret them and redefine them to achieve the project's objectives"* (Turner & Müller, 2013, p.5).

According to Anantatmula (2010), the first and most important step in managing and leading a project successfully is to outline the project processes and roles. Taking these actions are important because they will facilitate for creating a foundation for clarity, consistent processes, and communicate expectations. The main objective for the project manager is to create trust in managing the outcome, and project leadership plays a vital part to achieve this goal.

2.4.4 Skills related to the project manager

Skills that are needed by the project manager can be categorized into six areas according to Meredith et al (1995), which are team building, leadership, communication, technological, coping, and organizational skills. A large part of a project manager workload can be related to administrative matters, and Katz (1991) proposes that effective administration is depending on three skills: human, conceptual and organizational, and technical skills.

Human skills are primarily concerned with working with people and the skill is demonstrated in how the project manager perceives and identifies the attitudes of his/her colleagues, subordinates and superiors as well as how the project manager responds to these attitudes. El-Sabaa (2001) means that this skill is important for the project manager to work well as a group member and create a cooperative effort in the team. Katz (1991) highlights that the development of the administrator and his/her personal point of view of human activity are crucial to become an effective administrator.

Conceptual and organizational skills can be described as the ability of the project manager to envision the project as a whole. This skill also includes the ability to understand how all project functions are dependent of each other and how changes in one part can result in repercussions in all other parts. The project manager also needs to be able to let go of the project and understand the relationships between the individual project and the parent organizations. This is needed when the project manager needs to act in situations where the overall welfare of both the project and the parent organizations are concerned. In total, the project manager needs to have clear goals and good planning that depends on the overall environment and have a strong vision of the totality of the project (El-Sabaa, 2001).

Technical skills for a project manager mean in this situation that the person has ability to understand processes, procedures, methods and techniques within the area where the project manager is active (El-Sabaa, 2001). The author continues and points out that successful project managers should have relevant experience or knowledge of the technology that is used in the project.

However, this is only one perspective of what is important regarding administration in project management, and if project management trainings are observed around the world, there is little agreement among leading institutions and universities of what makes a project manager successful (El-Sabaa, 2001). Furthermore, El-Sabaa (2001) gives one example that there are great differences in objects and contents at the American university in Cairo between the various specializations such as the project management programs at the Engineering schools, the business school, at the institute of management development.

2.4.5 The ideal project manager in terms of characteristics

There is no distinct definition of what characteristics the ideal project manager should possess. Instead there are several definitions that include a wide variation of characteristics, mainly depending on from which aspect the problem is formulated. If

lists were to be created, they would be very exhaustive and the question arises if this person even exists due to the fact that the person often is described as some kind of superhuman. Archibald (2003, p.55) presents the following list of wanted characteristics for a project manager:

> *"Flexibility and adaptability; preference for significant initiative and leadership; aggressiveness, confidence, persuasiveness, verbal fluency; ambition, activity, forcefulness; effectiveness as a communicator and integrator; broad scope of personal interests; poise, enthusiasm, imagination, spontaneity; able to balance technical solutions with time, cost, and human factors; well organized and disciplined; a generalist rather than a specialist; able and willing to devote most of his or her time to planning and controlling; able to identify problems; willing to make decisions; able to maintain a proper balance in the use of time."*

If this is the criterion for the ideal project manager, and thereby also project success, it is likely that you will never find this person. Kerzner (2013, p.162) describes this person as following: *"This ideal project manager would probably have doctorates in engineering, business and psychology, and experience with 10 different companies in a variety of project office positions, and would be about 25 years old."* Since projects are carried out successfully around the world by project managers that most likely do not possess all these qualities, which are then the most important and should be prioritized?

Hauschildt et al (2000) mention several researchers that have studied empirical literature on project managers and highlight a researcher named Lechler (1997) that has reviewed 44 empirical investigations regarding factors for project success. In total he studied 191 unsuccessful projects and 257 successful projects and found that project managers mean a difference regarding the outcome of the project. Furthermore, the author also emphasizes that the human factors, such as project leadership, top management support and the project team are much more affecting the success of the project rather than technocratic instruments of project management. These instruments are planning, processing information and communication. If the project has greater complexity, risk and innovativeness, Lechler (1997) also found that the importance of human factors increases.

As mentioned above, the ideal manager is most likely not to be found with all desired characteristics or traits unless the person is extraordinary. A more practical solution presented by Romans (1985) suggests that the first step should be to determine the critical problems that the project is facing, and then assign a suitable project manager that can handle these problems. An issue with this perspective is according to Badaway (1982) that the main reasons why project managers fail at managing projects are due to lack of critical organizations and management skills rather than technical ones.

Posner (1987) conducted a study regarding what it takes to be a good project manager. He performed a questionnaire with 287 respondents were one question was: *What factors or variables are most likely to cause you problems in managing a project.* 900 statements were gathered that could be categorized as following:

1. Inadequate resources
2. Meeting ("unrealistic") deadlines
3. Unclear goals/direction
4. Uncommitted team members
5. Insufficient planning
6. Breakdowns in communications
7. Changes in goals and resources
8. Conflicts between departments or functions

As displayed in the list above, the problems that many project managers are facing are not direct technical problems. Posner (1987) also investigated a second question in his survey regarding which skills – characteristics, attributes, techniques, behaviors and traits that make a difference in managing a project successfully. The skills that the respondents answered in the questionnaire can be summarized as the same skills that earlier was mentioned by Meredith (1995) in the section *"2.4.4 Skills related to the project manager"*.

The concluding remarks presented by Posner (1987) include two different perspectives: whether a project manager should be assigned based on general skills and characteristics, or whether the potential issues related to the project should act as the basis of requirements when assigning a project manager (See Figure 2.3 for how skills and problems are interconnected). Moreover, Posner (1987) states that these two perspectives do not necessarily contradict each other. It is two sides of the same coin; a project manager needs certain skills to handle issues that most likely will occur in the project, or certain problems will probably take place and these problems demand certain skills by the project manager. As previously mentioned, the key problems that occur for the project manager are not characterized as technical problems. However, this relation does not imply that less technological skills are to prefer. An improved technological understanding can improve the project manager's competences regarding communication, team building, leadership and their comfort with changes in the project.

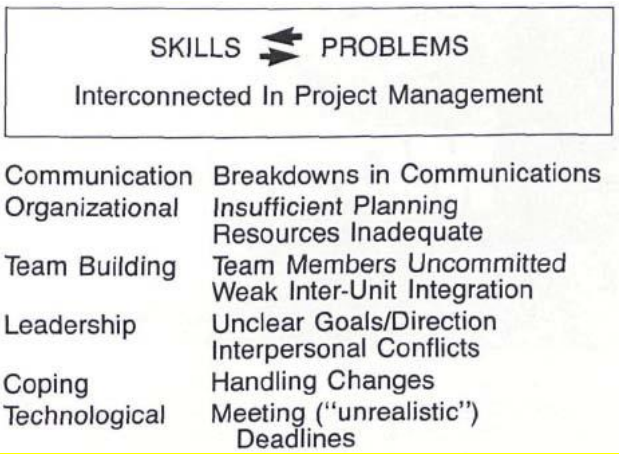

Figure 2.3 How skills and problems are interconnected (Posner, 1987)

2.5 Site manager – A construction project manager

The site manager is project manager during the contracting/production phase of a building or infrastructure project. Depending on contractual and organizational forms, the site manager can also be part of the design phase, managing the integration between design and production. Since most activities in the construction industry are organized in project form, the site manager is a key figure within the industry. This is due to that the site manager strongly can affect the performance of the construction projects. The site manager is accountable for numerous activities concerning performance, such as production planning, administration, leadership work, staff management activities, procurement and meetings with stakeholders (Edum-Fotwe & McCaffer, 2000; Rowlinson et al, 1993; Fraser, 2000). All together, the site manager is a central position in a construction project that handles faceted processes and activities. Furthermore, this section will bring some clarity regarding the role of the site manager and what the typical work duties are.

2.5.1 The role of the site manager

According to Farrell & Gale (2003), a site manager can be defined as the person who alone is responsible for a construction site enclosed by physical boundaries. Furthermore, it is stated by the authors that work duties encompass *"…being in charge of production and administration: directing, supervising and controlling the work of operatives; also coordinating the work of subcontractors and liaising with the client, consultants and third parties"* (Farrell & Gale, 2003, p.183). In the Swedish construction industry, Styhre (2011) states that there are large expectations on the site manager as the site manager often is described as a person that has complete control of the place of activity, always on the move to deal and solve arising problems, with the anticipation of working long hours. Furthermore, the author mentions that project organizations often resemble bureaucracies, where it simply is up to the site manager to reach the given objectives no matter what workload or overtime that is required. The site manager is expected to always be present, have a helicopter view of the entire project with detailed knowledge and understanding of all activities, not only regarding the practical performance but also regarding administrative, financial, and juridical questions. In relation to the literature, it is not hard to realize that many site managers are overworked (Djerbani, 1996). Although, the older generation of site managers see this way as 'the only possible way', Styhre (2011) points out that younger site managers start to question the approach of being involved in each and every activity on site. According to Styhre (2011), the main reason for the situation of the site manager derives from masculine ideologies, which has influenced the construction industry throughout history. In addition, the intensification of the role during the two latest decades has contributed to today's situation, not only because of the increased demand of production coordination due to more streamlined organizations, but also because of today's time-compressed projects (Styhre, 2006).

2.5.2 The site manager – A jack of all trades

The site manager is often described as the connecting link between the top management, which are responsible for strategic decisions, and the day-to-day production, hence often site managers are likened as middle managers in large corporations. As pointed out by Styhre & Josephson (2006), the site manager is not

limited to only be responsible for the day-to-day production, the role include several others areas such as administrative work, legal matters, and human resource management. In other industries than the construction industry, these responsibilities are often delegated to specific departments, or roles, within the organization of the corporation. Therefore, Styhre & Josephson (2006) state that the site manager must be a generalist to a greater extent than middle managers in other industries.

Furthermore, the authors discuss the transformation of the role and mean that administrative work has been decentralized to the site managers, and nowadays also include more strict demands regarding reporting to authorities about quality and environment. One direct consequence of this is that future potential site managers might not have the same interest in the site manager role as before, partly because the heavy overall workload, but mainly because the role include a lot of administrative work tasks that are disconnected from the actual day-to-day production. Styhre & Josephson (2006) highlight that this is especially relevant for site managers with technical interest regarding the production who enter large construction projects, where even more focus needs to be put on the administrative work, and the site manager simply do not have the time nor the possibility to be involved in every detail of the project because the size of the project. The site managers are often forced to prioritize between different objectives, where the main source of clashes is whether to focus on administrative work or day-to-day production. Site managers can be seen as a jack of all trades where the role is not only limited to the production but also require skills for managing heterogeneous processes such as dealing with leadership, HRM, and administrative work, without actually being supplied with appropriate training, resources or support functions for the administrative work. According to Styhre & Josephson (2006), this is one explanation why site managers rather focus on the production. The day-to-day production is what the site managers are good at, feel comfortable with, find satisfying, and what actually contributes to the final product. In addition, the workload of the role has increased, and the lack of time contributes to the down prioritizing of additional work tasks not directly linked to the production.

2.5.3 Important aspects to consider as a site manager

In the section *"2.1 Project basics – Definition of a project and its characteristics"* the nature of projects is described. The role of the site manager is heavily affected by these characteristics, especially for how to perform the everyday work. One factor that might affect the site manager more than others is how to deal with uncertainty. In turn, the site manager has to manage the uncertainty in order to accomplish a successful project outcome. There are especially two aspects that can be related to uncertainty that require extra focus in the construction industry: how to manage risks and how to deal with health and safety (Hare & Cameron, 2011; Simu, 2009).

2.5.4 Health and safety

In their article, Hare & Cameron (2011) state that the construction industry faces larger challenges regarding health and safety compared to other industries. Throughout history the construction industry has been described as having large amount of work accidents and injuries, which in some cases unfortunately have included death of labour. Thankfully, the negative trend has reached a turning point with a reduction of accidents in the industry. According to the authors, this is a direct

effect of the increasing work with health and safety as a cornerstone to assure safe construction sites. Despite the fact that the construction industry has come a long way regarding the work with health and safety, Josephson et al (2013) state that the main goal for site managers is to reach Vision Zero – with no work related accidents as the obvious proof of safe construction sites. In order to do so there are strict requirements concerning health and safety, which in turn often is described as one of the toughest responsibilities for site managers.

To prevent that accidents occur, the site manager is often assigned something called the Bas-U responsibility, which lasts throughout the entire duration time of a construction project. This is typical for the Swedish construction industry and means that the site manager is personally responsible for the work environment at the workplace, and can be facing jurisdictional actions if an accident occurs. It is required that the site manager has passed a RBK-education before being assigned the responsibility for Bas-U. Furthermore, one large part of the work environment management is to motivate the personnel, to get them to prioritize their health and safety. As a site manager it is impossible to control everything that happen on site. Therefore, it is paramount that everybody helps out to prioritize questions regarding the work environment, which is achieved by implementing an awareness of the consequences of the risks, and how to mitigate them (Ganahed & Otter, 2013).

2.5.5 Construction risk management

When managing construction projects, decision-making is vital for proceeding with a project. According to Simu (2009), decisions are often related to changes in conditions concerning construction, the environment, geotechnical aspects, economy etc. Somehow, all decisions related to changes affect the project in terms of new conditions for the project, especially since a lot of activities are interdependent. Therefore, taking one decision comes with a risk; will the project as a whole be affected positively, or negatively?

Compared to the manufacturing industry as mentioned in section *"2.2.2 Not a typical 'inside four walls' industry – a project of temporary nature"*, where the production area is adopted to the product that is produced, an infrastructure project is affected by lots of uncertainties and risks, especially because of the ground conditions of the construction site. This creates a situation where issues need to be solved when they are found on-site, and the site manager needs to be a problem-solver and thereby be able to react rapidly.

In general, risk management in the construction industry is mainly based on site managers' own experience and judgement, chiefly in small projects (Simu, 2009). Furthermore, the use of risk management in the construction industry is rather basic. Focus is on checklists and brainstorming, not on complicated calculations of probabilities built on statistical numbers. In addition, risk matrices are also used in construction projects. No matter what risk management method that is applied, it is often up to individuals to evaluate the consequences and probabilities related to risk management. Therefore, experience is paramount for taking right actions. According to Simu (2009), experience is extra important for site managers as they are the main responsible for reaching the project objectives. The workload of the role include dealing with the budget, quality and safety on site, project management, but also

technical skills for how to construct the project. As a site manager it is necessary to have experience and knowledge regarding all these areas, otherwise risks are that wrong actions will be taken which can jeopardize the entire project.

2.5.6 The muddling through day to day activities

As earlier mentioned by Dubois & Gadde (2002), the construction industry is a loose-coupled industry between the projects and the parent organizations. This relation demands key roles in the projects, which in the construction industry usually include the role of being the site manager. In turn, this causes that the site manager must be good enough in managing the project without any greater help from the parent organization. The site manager works at the construction site with both the company's employees, sub-contractors, designers and architects. Parties that are procured for the project often work on short-term contracts, from a number of hours to the whole project time. The site manager has in turn usually one or more foremen/supervisors that control the construction workers, and the foremen/supervisors are also the link to the site manager. Due to flat hierarchies in Sweden between the top management and the skilled workers, construction workers occasionally talk directly to the site manager. Moreover, the site manager leads meetings with the foremen and other construction actors where the project's progression is discussed and focus is on future activities/events/milestones. The site manager also attends to meetings with client representatives and end-users. Thereby, the site manager is both a project leader as well as a company representative towards the client. It is common that the site managers see themselves, and are seen by the industry, as the centre in projects where everything revolves. Summarized, site managers are in charge of most activities in the project and there are usually many activities happening simultaneously. To manage everything, the site managers work long hours and are unwilling to leave the construction site, afraid of losing control of the activities. The site managers are thereby fixed to the construction site, especially during hectic periods unable to attend personal development courses et cetera. The site manager is also responsible of the work environment, and one management technique that is frequently used by site managers is to simply walk around the construction site and chat with the skilled workers about the work progress (Styhre, 2012).

Due to decentralization, extensive administrative work has been placed upon the site managers which many find hard to find time executing. This creates a situation where the site managers in most cases need to prioritize between administration and the flow of the production. The site managers mostly prioritize the production since it is the core business and is considered as “real site management work”. In the interview study performed by Styhre (2012), one of the older respondents pinpointed the historical aspects. The respondent explained that back in the days, a site manager did not even see an invoice, but today it is still the same amount of production management expected, together with the administrative work tasks on top of that. The administration is often handled in early mornings and after the workday at evenings, which show upon that the site managers usually are working long days. Administrative matters that the site manager often manage are: planning, working hours registration of construction workers, calculations regarding cost, protocol writing from meetings, time planning, and changes as well as additional works regarding the production (Lundell & Karlsson, 2012).

2.5.7 Experience – a necessity for the site manager due to the structure of the industry

As discussed in *"2.5.5 Construction risk management"*, uncertainty is a constant present factor that affects the role of the site manager. Not only is it challenging to perform risk management without production experience, almost all actions require earlier work experience related to the production as the site manager often is described as a jack of all trades with focus on problem-solving. However, one can argue why production experience is of importance. In *"2.2.5 Transformation over time – a new set of requirements"*, Szentes & Eriksson (2013) indicate that the construction industry is beginning to be of a more standardized nature, and give the implementation of prefabricated elements as an example of this. However, the industry is only in the beginning of the standardization. Due to the low proportion of standardized processes, and the constant uncertainty as everything evolves around a specific site with unclear ground conditions, the industry puts pressure on having proper production experience. The key roles are expected to alone solve situations; hence production experience is paramount for the site manager. However, it is difficult to judge what experiences that are the most important. As earlier mentioned, the production-related problem solving requires production experience, but the site manager is in charge of other work tasks as well. For instance, the job description also encompasses how to structure a project. Since the construction industry is characterized by temporary projects that are put together in order to create a unique product, there is a variation of competences needed, and it is up to the site manager to design and manage the cross-functional project team. Although, as highlighted in section *"2.3.2 Factors affecting the organization structure in construction projects"*, this might not be as hard for more traditional projects with less people involved as in large infrastructure projects with large amount of people that needs to be coordinated. However, it can be questioned if production-related experience is needed for these tasks.

Furthermore, due to the high degree of uncertainty, and continuously revised planning of interrelated activities, the construction industry needs decentralized on site decision-making. Section *"2.3.3 A constantly uncertain market – how to proactively work with changes"* actualizes the challenges of forecasting future events, and therefore it is crucial for the site manager to have production experience when problems arise. The construction industry is characterized by being a loose coupled system between the individual projects and the permanent organization, which puts pressure on site managers ability to perform construction projects without predetermined solutions given by the main organization (Dubois & Gadde, 2002; Löwstedt, 2017). The loose relation between individual projects and the parent organization hampers centralized decision-making, which forces key roles within individual projects to have relevant experience to ensure a successful project outcome. Additionally, Jens & Meckling (1992) argue in *"2.3.4 Centralized versus decentralized decision-making"* that it is beneficial to combine decision-making with the relevant knowledge for the decision, which also favours decentralized decision-making from the main organization. However, one could question if the site manager should not delegate decision rights to skilled workers with more task-related knowledge in order to maximize possibilities for correct decisions. However, as Olsson & Westholm (2015) point out, site managers are often stuck in their own bubble and have difficulties delegating decision rights since the site manager has the

final responsibility for all actions taken on a construction site. If something goes wrong, the site manager is the one to blame. Additionally, it can be questioned if the most desirable attributes are requested for the role since the construction industry is rather conservative (Nam & Tatum, 1997).

2.5.8 Hard skills vs soft skills – what is needed for the role?

The site manager is active in a masculine industry as earlier mentioned and the industry is also usually described as conservative which implies that hard skills are favoured. As been described in previous sections, the site manager's workload has increased during the past decades, often with no extra resources added to the project organization. The site managers are often creased with a tight budget and are anticipated by the parent organization to deliver a good economical result. The projects are time-compressed and has become even more time compressed during the past decades. Delays are one of the most costly risks that can occur for a project. Therefore is the time planning an important leadership tool for the site manager. The projects are always broken down into smaller activities where different subcontractors execute the activities. This can be interpreted that the site manager in many cases uses a direct steering leadership rather than supportive since the subcontractors are the experts who do not need any greater supervision. If foreign workforce is used, authoritarian leadership are used due to cultural differences.

In section *"2.5.1 The role of the site manager"*, the site manager is described as a person that is in charge of everything and there is an anticipation in the industry that the site manager should be familiar with the all activities in the project. This demands experience and building skills which is highly appraised in the industry as well as listed as a need in earlier research. Furthermore, in most cases the projects are of a cross-functional nature where employees come from different companies. In those cases it is not the site manager's responsibility to steer the subordinates since they have their own superiors. The different companies are hired and are supposed to deliver results which implies on a transactional leadership which also is suitable for time-compressed situation which many projects meet. As mentioned in *"2.5.1 The role of the site manager"*, younger site managers start to question the approach of being involved in all activities, that the masculine dominance decreases and the entrance of more partnering projects implies that focus will be shifting to more soft skills.

3 METHODOLOGY

The following chapter presents which research approach that has been applied, and the main strategy of the report. The foundation of this master thesis is the theoretical framework and contains areas like characteristics for construction projects, organizational skills needed for managing a large infrastructure project, and the role of the project manager versus the role of the site manager. The empirical data for this master thesis has mainly been conducted through an interview study, and the data will later be analysed in relation to the theoretical framework.

3.1 Method outline

This master thesis has taken on an explorative research approach since present literature is lacking information within the studied field. Furthermore, this thesis is based on a qualitative research method where an abductive approach has been adopted. An abductive approach is a combination of the more traditional inductive and deductive approaches, where the first step is the consideration of facts, which often are received through observations and/or interviews (Le Duc, 2007). The aim of the collection of facts is to create a foundation for developing a hypothesis, which puts the observations in relation to other facts, or theories that will account for them. The process of correlating and integrating the facts is used to put the facts into a wider context in order to obtain a description and explanation of specific situations/behaviour. The collection and analyse of theory and data is accomplished in parallel (Svennevig, 2001). According to Bryman & Bell (2003), a qualitative research method provides in-depth results as the method focus on words rather than numerical data, which facilitates for obtaining detailed information that displays the actual situation for project directors in today's construction industry. The purpose of a qualitative research is to increase the understanding of attitudes that explain why human behaviour is in a certain way instead of how human behaviour is. One strength of a qualitative method is its ability to raise awareness of the subject that can change course of action when knowledge is obtained as a result of the qualitative process (Savin-Baden & Major, 2013).

3.2 Selection of the case study

In a country of the size of Sweden, the road network and other infrastructure for transport play a vital role for growth and the country economy's functionality. A well-functioning and efficient infrastructure is a necessity for further expansion of the Swedish society. However, in international comparison, the Swedish infrastructure system is weak (Sveriges Byggindustrier, 2003). The accessibility that the infrastructure system should give to society needs to be developed. There are obvious shortcomings in today's infrastructure in Sweden (Trafikanalys, 2011).

Furthermore, the population of Sweden is expected to increase with 1,5 million people by the year 2050. In parallel, the amount of freight and passenger transports will increase, which puts even more pressure on the poor existing infrastructure system in terms of increased need for housings, roads and railways (Kungl. Ingenjörsvetenskapsakademien (IVA), 2016). In order to deal with these issues the Swedish parliament approved a proposal regarding long-term goals for future

transports in May 2009, where the overall objective reads *"Transportpolitikens mål är att säkerställa en samhällsekonomiskt effektiv och långsiktigt hållbar transportförsörjning för medborgarna och näringslivet i hela landet." (*Trafikanalys, 2011, pp.18) In addition to this, the Swedish government left a proposal for further infrastructure investments in October 2016. The proposal includes a suggestion that 622,5 billion SEK should be invested in infrastructure projects during the period 2018-2029 (Prop. 2016/17:21). The amount of the proposed investment can be compared to the latest aggregated data from 2009 where public infrastructure investments amounted to 32 billion SEK per year (Trafikanalys, 2011).

To perform successful large infrastructure projects is crucial for the future development of Sweden. Because of the importance of a sustainable infrastructure situation, large infrastructure projects will therefore serve as the basis when evaluating the role of the project director. The Swedish construction industry already encompasses lots of large infrastructure projects, but in the future, it will contain even more. By addressing potential issues related to the role of the project director in today's large infrastructure projects will increase the awareness of what is expected from the role in the future to ensure the deliverance of successful projects. Therefore, a case study was performed with focus on the role of the project director as a crucial factor for project success and ensuring future sustainability of the Swedish infrastructure situation.

3.2.1 Description of the selected projects for the case study

In order to examine today's environment and the development of tomorrow's challenges in large Swedish infrastructure projects, this master thesis puts focus on the crucial role of the project director. Therefore, this thesis includes a case study that represents the reality of the nature of large infrastructure projects. Seven large infrastructure projects were chosen for the study and the selection consists of projects all located in Sweden. These seven large infrastructure projects were chosen for the study based upon two factors, the size of the project organization and the budget. The projects that are studied in this thesis are all infrastructure projects where the construction budget ranges from 500 million SEK up to 9000 million SEK, which are to be considered as large projects in Swedish standards. Six of seven projects are situated in the Western parts of Sweden where five of them are located in the city of Gothenburg, and the last one is executed in Stockholm. Two of the projects are completed, four of the projects are in the middle of their execution phase, and one of the projects is in the beginning of the execution phase. The variation of the studied projects contains two bridges, two tunnels and three large road projects. This is a very overall characterization of the projects since the two road projects also include either bridge or tunnel construction as well as the others include road and piping works. The projects are mostly located in dense city environments and all projects are considered as complex construction projects in various aspects such as major diversions in traffic, challenging ground conditions, and unusual execution methods for being in Sweden. Furthermore, four of the seven projects are joint ventures. The interviewees are employed by following companies: Skanska, NCC, Peab and Züblin. These four companies were chosen because they all are considered to be suitable representative companies for the Swedish construction industry with both economical muscles and long experience from delivering successful large infrastructure projects.

3.2.2 Description of the interviewees at the contractor

In order to obtain relevant data for the study a qualitative interview study was conducted where several roles were interviewed. An interview study with a semi-structured approach was chosen because this master thesis aims to present an in-depth description and discussion of the situation for project directors in large infrastructure projects, see *"3.4 Interview study"* for further information regarding how the interview study was approached and conducted.

All interviewees at the contractors are in the age range of 40 to 65 years, and the distribution in gender is one woman and seven men. Seven of them work as project directors, while one as regional manager. When choosing, the specific interviewees representing the contractor, the project directors of the projects were chosen since this master thesis aims to evaluate the role of the project director. The representatives of the contractor had in most cases the ultimate responsibility regarding finance and time planning towards the client as well as the main organization of the contractor. The seven project directors that have been interviewed are all in a top project management position. Their Swedish professional titles differ but all have similar organisational positions in their project organisations as the utmost project manager. The Swedish professions among the interviewees are regionchef, projektchef and projektdirektör.

Six of the seven project directors have similar personal backgrounds. They all have an academic education, variating from three to five years at a Swedish university. All these respondents started off their professional career as supervisors or comparable roles in the construction industry. The time that has been spent in these roles varies, however the next step in the career has been as a site manager position in construction projects of varying sizes, usually larger and larger as the career went on. This career path has not been a straight line for all the interviewees and alternative occupations have been common such as work abroad, support functions and line manager in the parent organisation. However, summarized, all the interviewees have climbed the career latter mainly by working at the contractor in roles that are directly related to the actual day-to-day production on site. Furthermore, this will be referred to as climbing the career latter the traditional way in the upcoming chapters of this master thesis.

In contrary to the six project directors that have a traditional background, one interviewee has a non-traditional background. Like the rest of the project directors, this respondent has an academic education at Swedish university. However, the professional career of that respondent is characterized by working in several different industries such as; pharmaceutical industry, engineering industry, and energy industry. Mainly the role in these industries has been as a project manager. Recently, this respondents career took a turn, and the person now works as a project director at a contractor.

3.2.3 Description of the interviewees at the client

Additionally, two interviews with represents from the Swedish Transport Administration have been conducted. Both represents have the Swedish profession *Projektchef*, but in contrary to the rest of the interviewees they work as project directors at the client. Their profession is whatsoever not of any interest for the study. Instead the aim of these interviews is to get their picture of the role as a project director at the contractor, and what they believe is important for the role. Both of the

interviewees have long experience of collaborating with the project directors at the contractor, especially in large infrastructure projects. In addition, they have similar backgrounds as the project directors representing the contractor, meaning that they have experiences from working in production at the contractor.

3.3 Literature study

Since an abductive research approach was chosen, the literature study was carried out in parallel as the data collection (Svennevig, 2001). The literature study can be described as an iterative process where the theoretical framework constantly was reviewed and adjusted in relation to what the interviews revealed. The aim of the literature study was to create a context for the results of the study. In addition, it facilitated for finding out how relevant the results from the interview study was. What could be supported and strengthened by the theory? What is contradicting? Summarized, the gathering of earlier research facilitated for anchoring the relevance of the findings, as well as for gaining an understanding regarding the nature of the role of the project director.

In order to find relevant literature for the study mainly scientific articles and books have been reviewed. In addition, reports published by organizations in the construction industry together with older master thesis have also been examined. The main databases that have been used in the literature study are Google Scholar, Scopus, and databases connected to Chalmers library. Early on, the literature study focused on literature concerning project characteristics, large construction projects, project management etc. in order to grasp the subject. After establishing the context of paradoxes in large projects a second phase of the literature study was entered, which included search terms such as centralized vs decentralized organizational structure, decision-making, and an in-depth descriptions of the role of the site manager.

3.4 Interview study

According to Bryman & Bell (2003), a qualitative research approach encompasses either semi-structured or structured interviews. When performing the interviews a semi-structure was chosen to assure that open discussions would occur in order to gain a deeper understanding of the role of the project director in large infrastructure projects, and furthermore, an awareness of their everyday situation. The interview study was not only limited to project directors at the contractors, but did also encompass represents from the client to obtain both perspectives of the role. Seven interviews were conducted with contractor respondents and two with client respondents. As a complement for the authors, one regional manager at Skanska has been interviewed to gain a holistic understanding of how large infrastructure projects are executed. Focus during the interviews was on how the project directors interpreted their role, what competence that is needed for the role, the influence of relevant experience, and differences between small and large projects. For detailed information regarding what questions that were asked, see Appendix I and Appendix II.

Prior the interviews were the respondents requested to send the authors an organizational chart of their project. This was done to give the authors the possibility to pinpoint questions about their specific project organization and examine the structure. The respondents were not given the questions beforehand since the authors

were concerned that the respondents could have preconceived notions regarding the questions and the subject in total. The authors strived for an open-ended interview and discussion.

Nine of ten interviews were conducted face-to-face and the interviews lasted for about one and half hour each, and notes were taken by the authors. Nine of ten interviews were recorded. The reason for the non-recorded interview was that it was performed through phone which made it impossible to record. To ensure in-depth discussions and receiving detailed answers regarding the research questions, all interviews were conducted in Swedish, the mother tongue of all participants. The recordings were after the interviews detailed summarized and analysed accordingly. The interviews created the foundation for the empirical result which later were analysed in relation to the theoretical framework. Follow-up interviews were carried out by email where complementary questions relevant to the obtained data were asked to get an even deeper understanding, and/or clarifying of specific answers. All interviewees and responses were processed anonymously and only the authors of the thesis have access to the detailed information collected and of what the individuals have said. Hence, detailed professions and names are not recited in the thesis.

3.4.1 Survey

The interviewees have been asked to complete a survey where twenty competences/attributes were presented. The question connected to the survey was following: *Select the seven most desirable attributes for a project director.* The survey was inspired from a research report by Josephson et al (2013): *"Sveriges bästa platschefer – verklighetens förnyare"*. The order of the attributes was randomized for all interviews to prevent that one attribute would be favoured due to a specific place in the list. See Appendix III for detailed information regarding the survey.

3.5 Limitations

Bryman & Bell (2003) emphasize that a qualitative method is a rather subjective research method where it can be hard to generalise the results. This study takes place in Sweden and focuses on projects that are situated within the country border, mainly in dense cities. In addition, only the perspectives of the main contractor and the client are reviewed where specific roles have been interviewed. Therefore, one should have in mind that the conclusions of this study do not necessarily answer for the construction industry in general. However, this study can give indications for what competences that are needed in large infrastructure projects, and how to deal with these situations.

3.6 Method reflection

One issue in the thesis is the selection of projects. The construction cost ranges from 500 million SEK to 9000 million SEK. By natural causes, there is a quite big difference between these projects regarding the number of employees, and thereby the structure of the project organization. The interviews were conducted with four different contractor firms and the contractors use different professional titles and their project organizations differs, which the authors have been needed to take in consideration when analysing the answers of the respondents.

One concern that the authors see in the interview study is the ratio between men and women that likely influence the interview study. But at the same time, it should be highlighted that this can be considered as giving a fair picture of the current construction industry in Sweden since the industry is dominated by men.

The result of this thesis should not be used on the construction industry in general since only civil and infrastructure projects have been examined. The roles, working tasks, allocation of work between colleagues may differ compared to the housing industry. A significant difference between infrastructure projects and housing projects is that the latter usually use more subcontractors.

Another potential issue that should be emphasized is that all interviews were in Swedish, where the answers later were translated in English. Possibilities are that some data can be misinterpreted because of that the translation might have lead to that some information has been 'lost in translation'. However, Swedish was chosen due to that it is the mother tongue of all parts that has been involved in this thesis, and has facilitated for the authors to receive a proper understanding of large infrastructure projects and the nature of the role as a project director.

The division of work has been equally divided between the authors of the thesis, and both have been equally involved in the different parts of the study.

4 RESULTS AND ANALYSIS

The following section aims to gain an increased understanding of the nature of the role as a project director by presenting the results from the interview study. The section puts emphasis on important aspects that affect the everyday work life of a project director; how the role is affected by the organization structure, how the relation with the client affects a project, which processes project directors are involved in, and what earlier work experiences and competences project directors consider necessary to shoulder the main challenges. All these aspects are explained based on information that emerged during the interviews. In addition, the key findings from the survey will be displayed. In order to break down the answers into applicable data, the section will be divided in several subareas with correlating sublines.

4.1 Organization structure for large infrastructure projects

The organization charts in the studied projects have been similar to each other. However, there have been some differences due to project size, main organization, and the project team. Because of natural causes, the project organizations are larger in the projects where the tendering big has been larger. Figure 4.1 and Figure 4.2 display simplifications of the main characteristics of the two most common organization structures.

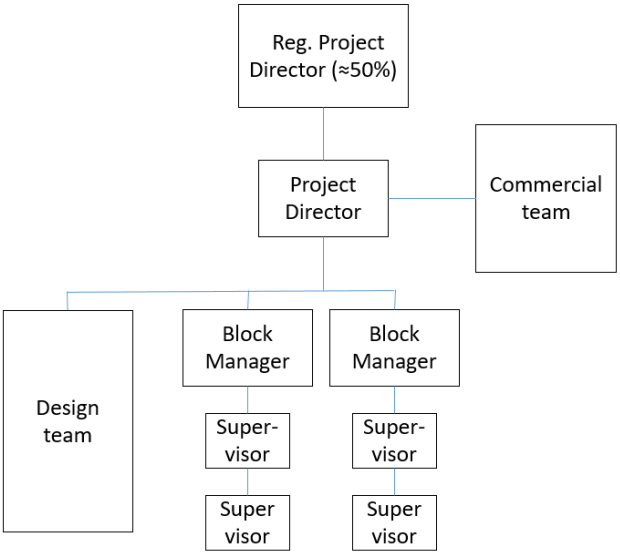

Figure 4.1 *The organization chart indicates that the regional project director only is part-time on the project, which means that the project director is closer to the production and involved in more activities.*

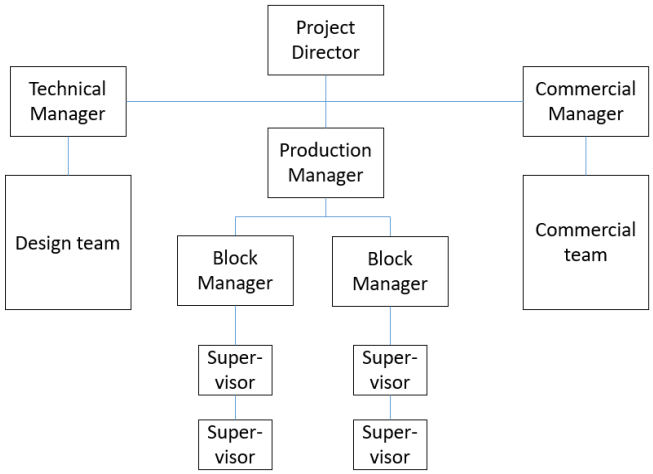

Figure 4.2 *In this organization chart the project director is working full-time on the project, and has a production manager responsible for the production, as well as a technical manager responsible for the design.*

The way a temporary construction organization is structured nowadays varies mainly depending on the size of the construction project. Historical, there has been one site manager that has been in charge of everything, even on the larger projects. However, the interviewees point out that the size of large infrastructure projects today, together with the complexity of many projects, have contributed to a shared responsibility regarding the role as the site manager for large infrastructure projects. Instead of one person having the main responsibility, and being in charge of both day-to-day production and the strategic management, the most common solution today is to divide the work task into two roles; project director and production manager. For all the studied projects accept one, the assignment of being in charge for the production is disconnected from the role as a project director. Furthermore, as stated by one interviewee, the implementation of *the four-leaf clover organization structure* (see Figure 4.3) with disconnected responsibility for the day-to-day production makes a construction company better prepared for entering and performing large complex infrastructure projects with a successful outcome. According to several respondents, the reasons for this disconnection is partly the heavy workload and unsustainable situation for the site manager in large infrastructure projects, but also that it eases for the project director to support other key roles within the temporary organization. When having the role as a site manager for a large infrastructure project, one must be involved in everything: production, economy, personnel, design etc. For large infrastructure projects that are of a more simple character that solution is possible, but for those that are of a more complex character the strategic management is more important as the resources need to be managed properly since the risks are larger. The interviewees mean that the disconnection of the production responsibility facilitates for raising your eyes and provides possibilities for working towards a longer horizon, which is necessary for efficient strategic management. That is not possible to the same extent if having the role as a site manager and being involved more in the production in a complex project, which often is the case for those situated in dense cities.

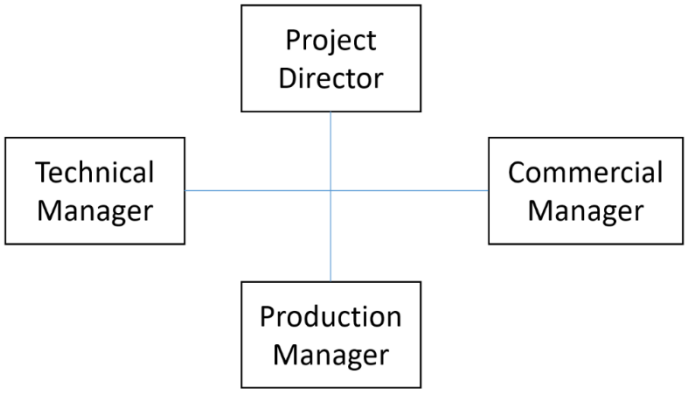

Figure 4.3 A visualization of the four-leaf clover organization structure with disconnected production responsibility from the project director.

There are several upsides regarding the adaption of both a project director and a production manager in an organization. However, it also has its downsides. The increased distance from the everyday production indicates that the project director must be more perceptive as not all issues reach the top management automatically. When having the role as a site manager, one is included in everything, and have more knowledge about all activities in the project. As a project director, it is essential to ask, listen, and simply walk around the worksite and talk to people in order to get the bigger picture of the actual situation and how people experience their work situation. It is a transformation where the project director must more intensively search for information, which Respondent #1 highlights, "*In my position as a project director it is more up to me to search for the everyday operative questions… I have been taught to find the information in other kind of ways, by asking around more*."

4.1.1 Bureaucracy – a necessity for implementing a well-organized structure?

When comparing large complex infrastructure projects with more traditional construction projects there are some obvious differences as mentioned in previous section. In accordance with the interviewees, larger organizations require different ways of working. Regarding how these organizations should be managed properly; all respondents highlight the importance of the organization being well structured. However, not all agree that this necessary implies that there is a more bureaucratic way of working. One thing that all the respondents constantly come back to is the importance of creating a well-organized way of working with clear routines for how to work. This is vital for more traditional projects as well, but the importance increases in line with the size and complexity of the project. Respondent #5 explains, "*The larger the project, the more careful you have to be with creating the playfield because you do not have the same closeness to the production.*" By clear distribution of roles and responsibilities a feeling of security is reached within project, which facilitates for how to deal with the situation if certain scenarios will occur.

A majority of the project directors state that bureaucracy facilitates for creating a well-structured organization where everyone knows what to do. The project directors mean that bureaucracy is necessary in order to create routines, and especially to develop a communication chart with distinct instructions for who speaks with who regarding different questions. One project director does not think that large

infrastructure projects demand a more bureaucratic way of working, and points out that bureaucracy is vital even in smaller projects. However, large projects encompass more people that need to be coordinated, hence the importance of bureaucracy increases, which in turn affect how to work. Respondent #1 explains, "*The difference is how to steer the organization. Large organizations require clear communication paths to assure that the right information reaches the right person. Therefore, a more bureaucratic way of working is needed.*"

Even though it is a more bureaucratic way of working in large infrastructure projects, it is vital not to limit the decision-making to the top management level. The decision-making needs to be distributed to the production manager, discipline managers and supervisors down the organization in order for the organization to be flexible and not too rigid. In addition, a large amount of specialists are often involved due to the complexity of large infrastructure projects, and need to be delegated decision-rights as well. All respondents get back to that it is paramount to do this when developing the organization chart in the beginning of the project so all involved parts know their responsibilities as well as their rights regarding decision-making. Several of the project directors highlight the organization chart as their strongest management tool in their toolbox.

4.2 Relationship with the client

When asked about the biggest difference between large infrastructure projects and more traditional projects, a majority of the respondents state that the economical risk is the largest difference. The client Respondent #10 explains the relation of the risks, "*In the end the risk of the entrepreneur is the risk of the client. If the entrepreneur does not handle their commitments it will be consequences for the surrounding traffic, and the situation will turn south pretty fast. Then, who has to stand there and take the blame for it? That is of course we as a client.*" Because of the risks in large infrastructure projects, it is vital for the contractor to establish a good relationship with the client. Large projects tend to be performed during a long time span, and therefore, it is of extra importance that the client trusts the contractor during the entire project, and vice versa. Without a good collaboration and an understanding for what the client wants, it is impossible to finish a project within all parameters for a successful project. In addition, it is also necessary to understand how the client value different aspects; for instance, the budget might not be the most important aspect, but the project can not be delayed on any terms. Respondent #2 points out the importance of the relationship, "*To understand what the client wants is absolutely the single most important thing for a contractor.*"

4.2.1 Discussions and disagreements between the contractor and the client

According to the interviewees, there are several reasons for discussions between the client and the contractor. One respondent means that the most common reason is that the client is worried about some issues in relation to the contract, and continues that it is then up to the project director to understand why the client is worried, and take actions to solve the anxiety. In general, the meetings mainly concern how the different parts interpret the contract, hence discussions and disagreements erupt as both parts wants what is the best for them. To maintain trust throughout the project transparency

needs to be favoured and prioritized. One of the respondents stresses that it is the project director's duty to constantly ensure that the client is being properly informed regarding everything that is relevant for them to know, nothing should be kept from the client. In order to strive towards a successful collaboration between the two parts, it becomes more usual to include incentives in the contract for close collaboration. A start-up meeting with the client is often performed to implement a common view of the project with shared objectives. Furthermore, the two parts meet on a continuously basis throughout the entire project to ensure that the shared view is kept, and to find ways of improving the collaboration. Meetings are often planned weekly. However, as stated by one respondent, most of the conversation with the client is through phone or mail, and occurs almost everyday.

One of the respondents means that the contact with the client is as important in any project as in large infrastructure projects. However, there are more questions that the client must be involved in, and there are more authority requirements to relate to. The organization does not only swell for the contractor in large projects, but for the client as well. Therefore, more people from the client are involved in large infrastructure projects; hence the communication is more frequent. Respondent #4 states the following, *"The Swedish Transport Administration have more represents that work 100% with larger projects, so the need for a close collaboration increases in order to achieve a successful outcome.*" The same respondent continues "*It is often possible to manage smaller projects on a single board where one directly can see the entire time horizon and all activities needed to get to the final product... In large infrastructure projects it is necessary to break down the large project cycle into smaller project cycles to reach a clearer picture of what is needed to see the common final product. And to do so, more meetings with the client are necessary."*

4.2.2 Communication – a necessity for close collaboration

In the beginning of a project a joint communication chart is drawn up where the daily correspondence between the client and the contractor is channelled up. There are a lot of channels that have to work in parallel in large infrastructure projects. Both organization structures at the client and the contractor are compared, and communication routes are being drawn; who speaks with whom regarding which issues?(See Figure 4.4) The communication chart contains a decision-making structure where specific communication levels are implemented. The aim of the joint communication chart is to display who is in charge of what decisions, and as an effect of this get a systematic way of working. In agreement with the communication chart, some issues should be solved at one specific level, while other should be escalated to the next level. Here it is up to the project director to act as a communication filter. Which questions should be filtered out? How should it be spread out so the questions reach the correct person with relevant area of responsibility? One of the interviewees stresses that construction related experience increases chances for understanding not only the daily work life of co-workers at the contractor, but also the daily work life at the client, which in turn facilitates for the communication with the client.

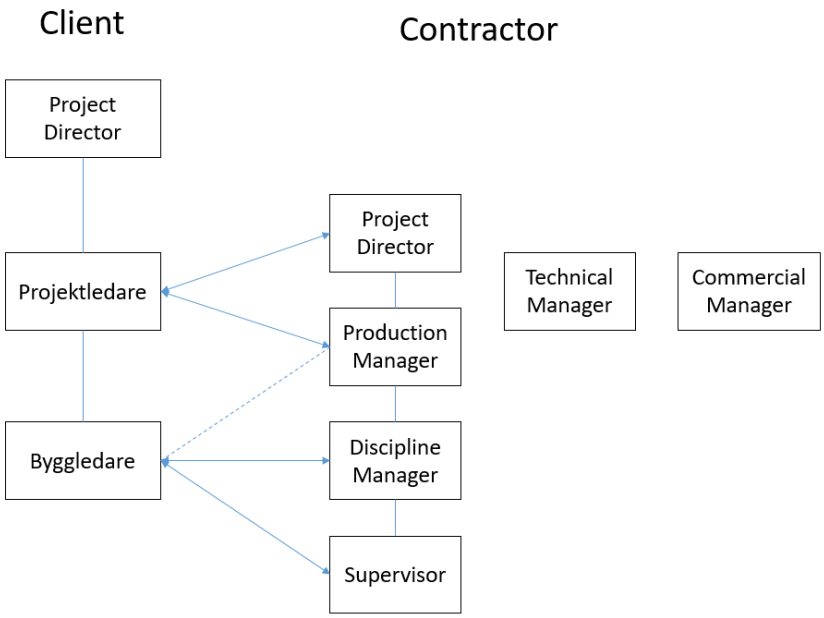

Figure 4.4 A simplification of a joint communication chart between the contractor an the client.

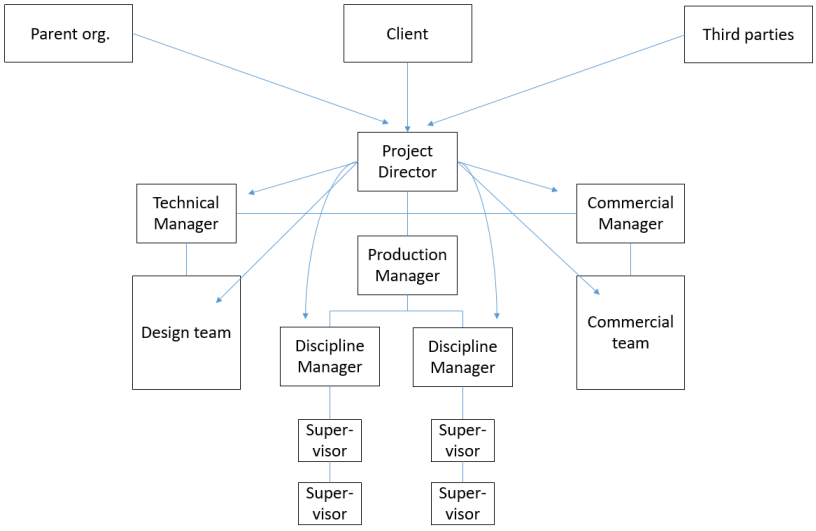

Figure 4.5 An illustration of how the project director's function as a filter in the internal organization.

Another respondents highlights that a consequence of inadequate communication easily leads to irritation at the client. If the communication relation between the project director at the contractor and their counter part at the client becomes irritated, the bad communication is often mirrored within the whole organization; a negative domino effect occurs, which reflects in negative attitudes in both organizations that hamper the project for both parts. The same respondent points out that it is necessary for the project director to have knowledge and patience regarding the client; a lot of processes at the client are time-consuming and involves several governmental authorities.

4.2.3 Trust – hard to gain without experience

One recurring word when discussing the relation with the client is trust. All respondents touch upon the importance of a transparent and respectful relation where both parts can trust each other's counterpart. The client has expectations on the contractor, and vice versa. When talking about the role of the client Respondent #9 mentions, "*I want the contractor, or more exactly the project director, to understand that the client wants to create best possible conditions for the contractor to perform their work successful.*" Similarly, the client expects that the project director optimizes the organization to perform the project in the most optimal way possible. In order to gain trust among all involved parts it is beneficial to have a lot of experience, not necessarily for the project director, but at least for the organization. Without having the necessary competence and experience within the organization, the respondents state that it is hard to gain trust. It is also beneficial to have performed similar projects before, both as an organization as a whole, but also as a project director. Not only does it ease for gaining trust at the client, but it also facilitates for scoring a high score during the tendering of the project. Some of the interviewees believe that a project manager from another industry can shoulder the role as a project director. But in that case, one of the biggest hinders would be to create trust among the client without having actual experience from the construction industry, which in turn would harm the relation with the client and obstruct possibilities for a successful project. It would also be hard for the project director to negotiate with the client and answer questions during meetings when lacking of construction related knowledge. However, as one respondents points out, if the project director lacks of proper experience or knowledge, one can bring a co-worker when discussing things with the client. Respondent #7 uses this approach and always brings three more persons to meetings with the client: the production manager, the financial accountant, the design manager, and sometimes even block managers are on hold by phone. The same respondent explains that bringing people with relevant knowledge increases probabilities of effective decision-making.

4.3 How the project directors interpret their work situation

Despite the heavy workload in general, the interviewees describe their work situation in mostly positive terms where they are part of a team that is creating something unique. Another thing that is highlighted is the possibility to influence their project in which way it should be executed. Several of the respondents mention the common Swedish expression "*frihet under ansvar*", which means that you as project director is responsible to achieve a goal, but you are not governed in any larger extent how to achieve it. That specific expression is very common among site managers in the construction industry when they describe what they appreciate mostly with their profession. Since all except one of the interviewees have a background as a site manager, and the project director can in many ways be seen as a extension of the site manager role, it is not strange that this expression is used in similar meaning. The project director is the utmost manager, which is similar to the responsibilities as a site manager.

4.3.1 The most important work task

When answering the question *What is the most important task for you as a project director,* all respondents highlight the importance of being a team leader. Three of the respondents use the soccer coach as a metaphor when describing the profession. In a large infrastructure project the project organization can consist of more than 50 white-collar and sometimes up to 300 blue-collar. Such a large organization implies several challenging moments for the project director, where the most crucial challenge is to ensure that clear and shared project objectives are set, which facilitates for getting all co-workers to head in the same direction, and ultimately achieve the final goal; a successful completion of the construction. Respondent #1 when trying to describe the work situation, "*Much of my work is to follow up and asking, setting goals and steering towards them, and let go of details."* Another description from Respondent #3, *"You are the team leader, coach or something similar, have a great responsibility, both in good and bad times and you try making the greatest possible exchange of the team available."*

4.3.2 Strategic management to proactively ensure the project progression

A majority of the respondents have difficulties to pinpoint what exactly they do in the project. The role is described as a mash-up of several work fields where the project director is included in an activity depending on the situation of the project. Despite the difficulties of describing their role, one consistent answer emphasizes the importance of their involvement in strategic management. In comparison with working as a site manager, there is a clear distinction that all interviewees work more with strategic thinking where focus rather is towards a long time horizon than instant problem-solving. The time horizon they work towards is usually from six months until the end of the project. The strategic management incudes planning of milestones, managing of project resources, selling of activities to sub-contractors, but also to examine how the project organization is running in general. Basically, the strategic management focus on how to work proactively to benefit the project as a whole. However, as the uncertainty constantly is present a lot of changes occur throughout a project, especially because changed ground conditions. Some of them are easy to manage, while other are more challenging. The strategic management is not only limited to the organization of the contractor, it also includes the collaboration with the client. It is important to have the possibility to early see potential issues, and beforehand adjust the activities in relation to these issues.

4.3.3 Project director – a multifaceted role

There are large variations in what technical issues a project director is involved in. In general, the project director is included in all technical issues that are related to economical aspects and cause larger changes for the project. The everyday life of a project director consists of continuous discussions regarding consequences of changes; time, cost, work environment aspects etc. Furthermore, all changes need to be evaluated and priced for the client, and the contractor together with the client must jointly decide how the changes affect the project, and reach an agreed solution for how to solve the problem. Respondent #2 describes the situation as follows, "*When managing the consequences of a change you investigate all possible scenarios. It is*

all about finding positive domino effects!" However, another interviewee points out that it is hard to simulate different scenarios without having the experience of having the traditional background.

In general, project directors spend a majority of their time in meetings, both with internal and external actors. Some of the respondents describe their role as being a communicator with the purpose of ensuring that relevant information is spread in the project; it is in meetings they can affect the project. The organization is the responsibility of the project director, and being a lubricant for the organization is a vital part of the work. Furthermore, Respondent #1 describes the role as follows, *"I am the link between the project-driven roles in the project"*. Respondent #5 actualizes tole of being a communicator, *"The amount of meetings is gigantic, it is almost continuously meetings."* The proportion of meetings is a large difference compared to more traditional projects, and the project directors highlight the importance of not attending in too many meetings; some meetings must be delegated to others. However, when issues occur, meetings regarding those issues are highly prioritized, and when asked about what the project directors would want to spend more time with, some of them mention the relation with the client, which in turn would imply even more meetings.

4.4 What competences are needed for the role as a project director

There is one competence, or attribute, that is stressed by all respondent, both the project directors and the client's equivalent; *delegation of responsibility*. That competence includes the ability to not have fully control of all details but still have a holistic view of the project, and thereby have an understanding of the project's static situation and its proceedings. Of natural reasons, when the size of a project increases, one can not have fully control of all activities, and chances are that the project director sacrifices other working tasks if being to engaged in some details. Respondent #7 addresses this issue, "*The more I know, the more I will interfere with tasks I should not interfere with, which is a sign of that I am not delegating enough. Therefore, I do not want to have more technical knowledge.*" Moreover, Respondent #1 puts emphasis on the workload, "*The day-to-day production is so full of risks, both technical risks and safety issues, that you easily could lie sleeplessly throughout the project."* The situation can be a psychological stress for the project director. Furthermore, the respondent stresses the importance of being secure in the role in order to be able to handle this stress, and explains that this security has been gained through production-related working experience. It is important to let go of details, which demands that a project director trust, empower, and especially delegate activities to co-workers. All respondents agree that it is necessary to rely on the project organization and delegate responsibility. Respondent #1 highlights the importance of having competence within the organization, "*I cannot have special competence in all parts, I must trust that I have the competences in my support functions."* The reasoning is strengthened by Respondent #6, "*In large construction projects the responsibility for the production must be delegated to the production manager. In turn, the production must delegate concrete details to the block manager. It is paramount to delegate and to trust that your co-workers do their jobs.*"

Compared to more conventional construction projects large infrastructure projects consist of much larger project organizations and thereby also an increased amount of people. The projects are usually divided in geographical areas, or technical disciplines with a dedicated middle manager that reports to the project director or steering committee. In a smaller construction project the information usually reach the site manager since the person is more involved in almost all activities in the project. A majority of the respondent emphasize that this create a demand of the attribute perceptive. The project director needs to be perceptive on signals that occur in the organization regarding the well-being of the staff, how the collaboration among colleagues works. Another respondent describes that the person actively has to search for the day-to-day issues that occur in order get a holistic view of the project, and continues that a well-designed project organization facilitates for knowing where to search for specific information.

4.4.1 Leadership skills – creating a team

The larger the organization is, the larger the challenges related to leadership. Respondent #5 explains, "*It is a lot about people. Very, very, very much about getting people to head in the same direction!*". Respondent #2 fills in, "*I guess leadership is more important than the technical knowledge in a project of this scale.*" Several of the respondents state that it is easier to create a shared vision and lead people towards a final construction in a smaller project due to less people, wills, and backgrounds involved. In a large project with more than 50 white-collar included, it is necessary to create a structure with shared objectives early on in the project. Because of the increased amount of people with different backgrounds and competences a majority of the respondents stress the significance of creating a team. It is paramount to implement a shared vision to create an understanding for the project as well as for other departments involvement in the project. Several of the respondents mean that this is reached by spreading information of what goes on in the project, and to point out how each and every one contribute for the final production, and how important their work is for future activities. In addition, one respondent point out that soft skills are of more importance at the moment because of the on-going construction boom. Many people try to take advantage of the situation to increase their salaries by changing jobs. Therefore, working with soft skills can prevent this and ensure that people like their jobs, which in turn facilitates for unifying the project team. In order to create a joint team where everyone feel committed, and in the extension reach a shared vision and final product, it is emphasized that clear roles and responsibilities are key. The project director of the largest project in the study stresses the importance of not forgetting anyone in the organization regarding sharing information. Many of those that are not working with pure construction related work tasks are often important cultural bearers for the project. All of the interviewees mention that as a project director one has the responsibility to create and maintain a positive and secure atmosphere throughout the project.

Unlike more traditional projects, Respondent #1 points out that "*It is more focus on establishing objectives that people can relate to instead of telling people to work in a specific way.*" Furthermore, the interviewee means that the two different type of projects demand different ways of leadership. As a project director the leadership is more coaching, goal oriented steering. It is possible to demand more immediately, and to delegate responsibility/authority to take actions, which in turn creates commitment

and is inspiring for the white-collars. As a site manager, you need more knowledge about all the activities, and you can not delegate to the same extent. The leadership has to be more direct, more hands-on activity-based steering.

4.4.2 The importance of being a negotiator

All respondents highlight the collaboration with the client as a main focus for the project director. Although, in the major projects there are always many interpretations of the contract that depends on uncertainties, changes in design, additional work or external factors that are hard to foresee. The respondents stress the importance that disputes are solved at different levels in their respective project organizations depending on the dispute. When the economically greatness of the dispute or its impact on the project gets bigger, the project director gets involved and often it ends up in negotiations regarding interpretations around contracts and formal agreements. According to the respondents, there is not usually a clear answer and it is rather more common that a settlement is reached between the parties. Thereby, it is vital for the project director to be a good negotiator and have the ability of doing good business. To be able to perform these negotiations, the project director needs a good understanding of the construction industry and its processes. Activities are often interrelated in the construction industry and chain effects are common. It is rare that a change of one process only affects one different process since activities are intertwined in each other. This puts pressure on forecasting consequences as small adjustments can affect major parts of the planning of other activities. It is important for the project director to have working experience from the production in order to understand chain effects and consequences of changes. If lacking of experience this can easily be missed as Respondent #2 highlights, *"Without experience, you maybe do not see the facts."* The respondent continues that this understanding sometimes is inadequate by the client's delegates, which puts even more pressure on the project director to explain different consequences in order to reach appropriate settlements.

4.5 Career-based experiences used in the role as a project director

In general, all earlier working experience can bring positive effects in the profession as a project director. Depending on the situation of the project, possibilities are that the project director needs to interact with each and every member in the project organization, especially the key roles. Therefore, the respondents highlight the benefits of working in the production as it creates an understanding for the everyday work life for colleagues. Respondent #3 describes that a regular day includes walking around the office talking to colleagues, checking the welfare of the staff, and simultaneously controlling on-going project activities. *"Experience as supervisor and project engineer gives me an understanding of what my co-workers work with and I have the opportunity to brainstorm with them and giving support if needed."* Furthermore, the respondent means that by having production-related experience it is possible to ask the right questions in order to evaluate the progress of the project, without the experience that would not be possible. Respondent #7 disagrees and states that it is all about the time schedule. By knowing the time schedule in detail in terms of the start and the end of an activity provides opportunities for the project director to ask the right control questions, and evaluate the advancement of the project.

The respondents use experiences from their entire working life in various aspects, but at more consideration, their time as site manager or production manager is emphasized as the most important background. When discussing how to develop a suitable leadership for leading large organizations, a majority of the interviewees highlight their work experience of climbing the latter the traditional way as a valuable asset. By experiencing similar professions like supervisor, site manager etc. have enabled for possibilities to exercise and practice leadership. The traditional way can be compared to a stairway where the requirements of leadership are intensified for each step. As earlier mentioned, leadership is considered to be a vital part of the project director's assignments and during the time as either a site manager or a production manager the respondents could train their leadership skills, develop leadership competences, and coaching skills. Respondent #3 explains, *"It is all about leadership, and leadership can be developed in different ways. For me, it has been the role as production manager that has been the most important, a position where you above all need to manage more people"*. However, one respondent questions the benefits of climbing the career latter the traditional way. Respondent #6 continues, "*We who become project directors in projects are not always the best leaders. We might be great building engineers who solve technical issues related to the day-to-day production, and now we have the responsibility of leading people and get them to work. That might not suit everyone just because you have a lot of production-related experience.*" Another respondent points out the importance of being comfortable in yourself when being the project director of large infrastructure projects, and states that this comfortability only can be achieved by exercise in similar construction roles. Furthermore, it is pointed out that during the time as a production manager, skills regarding how to design an organization structure are developed. By already having these skills facilitates for managing the organization regarding clarity, role definitions, and to evaluate if the organization is sufficient.

All respondents stress the importance of having seen how different activities are being performed practically since it creates an understanding of how processes are interrelated to each other. However, it is not necessary that one needs to have done the activities oneself, it is enough just being on site in the nature of the production. One of the respondents gives an example of the benefits of this when dealing with strategic management that includes planning activities far into the future. Planning future activities is sometimes very abstract when only reading blueprints with no actual real reference points. Because of the working life experience it is possible to visualize and understand the future geometry. This capability usually demands several years of training and practical work. The respondents also mention benefits in regards of risk management. A major infrastructure project consists of numerous of risks that need to be managed. It is hard to gain an understanding regarding both technical risks and risks related to safety aspects unless one have been exposed to the risks through earlier work experiences. However, when asked about how the project directors use their experience in order to work proactively with risk management, no concrete examples were given. Instead, only the project director with the non-traditional background could give a specific example of this. He had moved the QEHS (Quality, environmental, Health and Safety) and the time manager from being subordinated the production manager to become directly subordinated himself. The project director argued, if these managers are subordinated the production manager, they will mostly focus on risks concerning the production. He meant, especially in a design build contract, there are risks concerning purchasing documentation, design and time

planning that must be included in the total risk management systems as well as the production. It is the responsibility of the project director to structure and secure that the block managers map risks together with the supervisors within their specific fields, and that all risks are devalued. Next, the block managers put their risks together with the risks of the production manager. Then it is up to the project director to map the risks related to purchasing and quality working environment. All risks are summarized and later ranked depending of the danger of the risk. Finally, all involved key roles jointly go through all risks to try to find ways of mitigating them.

One of the interviewees mentions that it is rather the technical understanding than the leadership competences that is most frequently used in the daily life of a project director. Because of working life experiences, it is possible to be effective in decision-making regarding how decision rights are spread in the organization, proactively evaluate consequences of changes in different processes, and in managing resources in order to maintain a constant production speed. Furthermore, experience is needed to understand construction technical details that the project director occasionally faces. However, another respondent states the opposite and means that it is more important with leadership skills since it is all about steering a large amount of people towards a common objective.

4.6 Possibilities of a "non-production" project director

The respondents have different opinions of how well it could work to assign a project director without a traditional background in today's large infrastructure projects. Most likely their opinions vary because of their backgrounds, how their current projects are proceeding, what competences their co-workers have, and how the organizational structure is designed. A majority of the respondents are quite positive to the statement and can see possibilities of having a "non-production" person as a project director. Their entrance to the problem formulation is that leadership is the foremost quality that a project director need. What can be challenging is to create trust towards the client as well as internal in the firm. *"I believe it would work much better than most people in the industry believe."* - Respondent #1. The same interviewee continues the reasoning around the question connecting to discussions that the person had with friends that are active in other industries; work tasks for managers among other industries are similar to them in the construction industry, and gives examples such as organizational issues, setting goals, and how to reach them.

Almost all respondents can see a future where the project director has a different background than the traditional background, only one clearly states that it would not be possible. The main reason for this is that projects will increase in size and more skills are needed regarding leadership and coordination. However, all are concerned that issues can arise due to lack of production experience in such a scenario. The concerns can be merged into three groups, the client's trust, trust within the own organization, and risk management. One argument by Respondent #3 is as follows, *"The way the projects are organized today demands construction knowledge of the project director, it is built upon history, it demands a basic knowledge"*. Furthermore, Respondent #6 explains the benefits of having experience, *"If you have production experience, then it is much easier to understand your colleagues"*. Understanding the work situation of your colleagues does not only facilitate for managing resources, but also for how activities are related and what consequences certain changes will cause.

Another interviewee stresses the importance of the supportive function that is a large part of the project director's duties. Without production experience, it is impossible to support colleagues when getting asked about how to solve potential issues. Since the industry is heavily experience-based regarding construction processes et cetera, the respondent believes a non-production project director will have difficulties getting acceptance in decision-making since the person's creditability would be questioned.

Many of the respondents come back to "needed knowledge" for the role, which they mean is created through earlier experiences from being involved in the production. However, all had difficulties describing exactly what this knowledge consists of, and to break it down to concrete examples. Often it ended up being summarized as a general understanding of the industry and its processes rather than deep technical skills in specific products or processes. Simultaneously, in contrast to this "needed knowledge", Respondent #1 stresses the necessity of being a generalist, "*I can not have special competence in all parts, I must trust that I have the competences in my support functions."* Based on the "needed knowledge", the respondents do not believe in importing a project director from another industry such as the car industry since the understanding of the construction industry is crucial. But, the possibility with another background compared than the traditional background was not neglected since that person would have an understanding about the basic processes in the construction industry.

4.7 Major obstacles for managing large complex infrastructure projects

The major infrastructure projects demand a systematic working with risks. Since the project sizes and its associated budgets get greater, the outcome of potential risks becomes more influential to the planning. A majority of the respondents stress the importance of working proactive in risk management. One metaphor that was given by one of the respondents resembles a large infrastructure project like a vessel that needs pro-actions rather than reactions. A plan B is always desired in critical activities in order to prevent large costs that can harm the project. The risks do not necessarily differ in any greater extension compared to smaller projects, but the consequences are usually much greater due to large economical budgets. A failed project of this scale may lead to disastrous consequences not only for the project itself, but also for the company at large.

Based on history, one of the represents of the Swedish Transport Administration expresses the view that the most common reason why major projects fail is because of organizational reasons, and continues, "*The biggest risk is your own organization"*. Working with the organization has been a main theme among the project directors, and considered as one of the most important duties. In addition, this duty is also considered as one of the more difficult ones and an obstacle for delivering a successful project. In a major project, much more people with different backgrounds are involved, and it is challenging to create a positive atmosphere throughout the entire project organization. A common cause to bad tone in organizations is that information disappears, or do not reach the correct recipients. This can create situations where employees feel down-prioritized and do not feel that they are involved in the progression of the project. In order to avoid these situations, communication is often listed as a needed improvement. In the interviews, a majority

of the project directors emphasize the importance of well-organized structure regarding communication, decision-making and working processes. Many of the respondents stress that a solid "game-plan" is crucial for project's success, and express that one can not spend too little time creating the organization structure. Although, concerns are raised that the organization can not become too inflexible, which then would create irritation among co-workers. Respondents #1 addresses this dilemma, *"This is double-edged, it is important to keep to the organization. But at the same time, there must be some flexibility that allows for adjustments when needed."*

When asked about what leadership is none of the interviewees could give a distinct answer. The answers encompass a wide variation of attributes. Some of the respondents mean that the same leadership can be used in all situations, while other mean that the leadership has to be adjusted depending on the situation. In addition, some believe that the leadership should be authoritative, while other believe in a more democratic and coaching leadership. All respondents have their own interpretations of how a good leader act. In two of the studied projects it appears that external leadership coaches have been hired in order to help the project directors with leadership issues. According to one of these project directors, the external leadership consultant is needed because otherwise the work with leadership easily gets down-prioritized. The project director continues to address that focus is on strategic management, towards future activities to finish the project. By hiring a leadership coach helps the project director to create a feeling of unity in the team, which facilitates for ensuring that the project team is heading in the right direction towards a common goal. The other project director explains that the leadership coach helps for developing leadership skills that are needed for a project director in large infrastructure projects.

4.8 The survey

After the interviews, all project directors were asked to complete a survey with the following question: *Which are the seven most desirable competences/attributes for a project director in a large infrastructure project?* The result is displayed in Table 4.1 below. Here it should be emphasized that the survey was answered both by the project directors at the contractor and the client. In total, nine project directors participated in the survey. For the Swedish version of the survey, see Appendix III.

Table 4.1 The results from the survey

Attribute/competence	#
Experience	4
Good leadership skills	7
Driven	0
Communication skills	6
Automatic	1
Dedicated	4
Collaboration skills	4
Initiative ability	0
Service minded	0
Motivation of personnel	2
Business-sense	9
Decision making	6
Structured	5
Good planner (Prioritize & Organize)	2
Confidence-inspiring	2
Ability to delegate and coach other	7
High social competence	1
Humble	1
Conflict management	2
Technical/construction technical	0

The suggested competencies that scored most answers and are considered to be the most important for the project director in a large infrastructure project are: *business-sense, good leadership skills*, and the *ability to delegate and coach*. The survey confirm what has been discussed in the interviews, that the project director's most important task is to lead and organize rather than having deep technical knowledge of production.

It should be highlighted that the result indicates that there is one significantly difference compared to the survey by Josephson et al (2013). One competence that all of the responding project directors shared is business-sense, hence business-sense is considered of high importance for a project director, which can be compared to the survey performed by Josephson et al (2013) where the site managers considered business-sense as the second least desirable out of 18 competencies. This competence has been discussed during the interviews and several of the respondents stress the importance of doing good business and to not get fooled by huge numbers in the budget. Furthermore, this is also most likely connected to the relationship with the client where on-going negotiations are a recurring ingredient throughput a construction project. As pointed out in the methodology section *"3.4.1 Survey"*, this survey is inspired by Josephson et al (2013), where site managers answered a similar survey. The authors refer to this research report if the reader wants to know the exact result of that survey.

5 DISCUSSION

Here, the results will be discussed in relation to the theoretical framework. Since experience is commonly used in the construction industry the expression experience will be discussed in the beginning and then proceed to the research questions. The three additional research questions will be considered and discussed accordingly. The arguments around these research questions will later be combined and work as the basis for answering the main research question in the conclusion.

5.1 Experience - a house of cards

Experience can be a sensitive subject in the construction industry, since the industry itself values construction production experience in a high degree which also have been expressed during the interviews. When asked about the possibility of a non-traditional project director during the interviews, a few of the respondents became defensive and withdrawn. The question has in some cases been interpret as it was meant to assign a person without any relevant experience, such as a newly graduated engineer. Experience is hard to measure compared to age which is easily measurable, but age does not actually say that much. Although, experience is often measured in age.

The respondents in the interview study have in most cases similar professional backgrounds, but they still do have individual experiences that are valuable for them. Experience can be described as a house of cards, see Figure 5.1 below. The lowest level can be seen as basic knowledge, and the levels above are knowledge and competences that are gained through a working life. Assigning a project director without the right amount of knowledge is most likely a risky action. But what should the house of cards consist of for being a successful project director, and how is that experience gained? In the results, the competences and attributes that have been mentioned the most are organization skills, leadership, strategic management, delegation, and the survey also strengthens the need of business-sense. The traditional career path, from supervisor to project director at the contractor, gives most likely the opportunity to train all above mentioned desired competences. In the theoretical framework, the site manager is described as a jack of all trades with focus on being a generalist, which in many cases is appropriate even for a project director in a major infrastructure project. The site manager profession also gives the opportunity to practise construction production and associated risk management. Two aspects that a background from smaller construction projects maybe does not cover are the strategic management and organizational skills. The construction industry is considered to be a conservative industry and smaller projects are usually executed in a standard project organization. Although, a site manager do not climb from a small project to a major infrastructure project without having medium sized projects in between where these skills are practised.

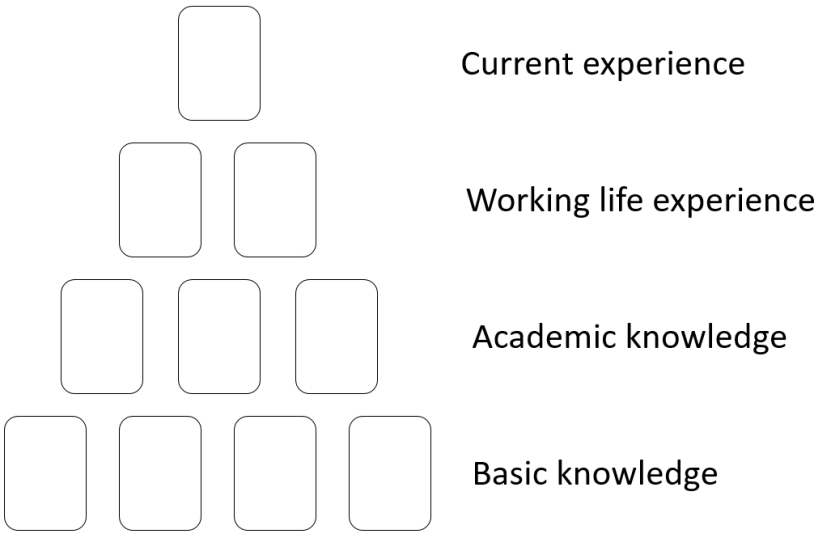

Figure 5.1 House of cards, experience gained through a work life.

Experience is an unclear competence and is hard to measure since it is a individual perception. At the interviews with the client respondents, expressions like "*we want the best possible project director"* have been pronounced. This is usually done by investigating if the project director in a tender document previously has managed a similar project in matters of size and complexity. However, it can be questioned if it is important that the project director has experience of performing similar projects before, or if it is enough if the project organization as a whole has the proper experience. How much credit can an individual person get from managing a similar project before, compared to the experience of the project organization as a whole?

The respondents stress that the traditional career path is valuable in order to better understand their colleagues, what they work with, and what challenges they are in front of. However, one can doubt if this is so important. A majority of the colleagues of the project directors are skilled workers, which none of the interviewees have worked as. In addition, large infrastructure projects include many specialists that usually not are included in smaller more simple projects, which makes this argument weak since the project directors have not had all specialists' professions.

5.2 What is a project director's main working tasks and how do they perceive themselves?

The role of a project director has mostly been described as the person that set goals and the direction for the project. Several of the respondents have used the metaphor soccer coach to explain their role in the organization. Tasks that have mostly been mentioned are following: resource planning, maintenance of the organization, client relationship and strategic management. Due to the wide spectra of activities in a large infrastructure project, the project director can not have specialized competence in all disciplines such as concrete, installation, geotechnical and steel works et cetera. Some of the respondents even argue that the project director does not need, or should not even have, specialized competences since the project director must focus on the holistic view and cannot concentrate on technical details. In those cases, where the project director works with details it can rather be considered as a risk of missing out other more important tasks related to the role of project director. This could for

instance be more strategic issues such as planning resources for future activities and financial monitoring. Furthermore, if a project director involves in details when not needed, it is a risk that the project director interferes in a colleague's work and then creates tensions in the organization.

Shortly, the respondents have described the project director like a project manager as presented in sections *"2.4* project manager*"*. When asked regarding their working tasks, most answers have been connected to project-management processes rather than product-oriented processes. Their answers correlates in high degree to the quote by Turner & Müller (2003, p.5) in section *"2.4 Project Manager"*.

In section *"2.4.4 Skills related to the project manager*", Katz (1991) stressed three skills in order to be an effective administrator. This is relevant since the project directors in high degree work with administration, and meetings occupy a large part of their working hours. The three skills are human skills, conceptual- and organizational skills, and technical skills. The main factor why project managers fail is according to Badaway (1982) due to lack of organizations and management skills rather than technical skills. This is emphasized from the interviews as well as the survey where none of the respondents selected technical/production skills as one of the seven most desirable skills for a project director. This also correlates with the results in *"4.7 Major obstacles for managing large complex infrastructure projects"* where organizational matters such as communication and organization structure are of utmost importance. Even if technical skills can be seen as "secondary", all respondents stressed the importance of understanding the construction industry and its processes, methods and procedures, which is similar to what El-Sabaa (2001) points out as what a project manager needs to know in terms of technical skills.

Something that has been expressed from both contractor and client respondents is the importance of understanding each other. The contractors' respondents highlighted the client relationship as one of the project director's main task after leading the own organization. Many of the contractor respondents stressed the importance of understanding the client's actual needs, especially since the tender documents often are incomplete. The insufficient tender documents often lead to changes and extra work for the project and most likely the project director. The need for a close collaboration from a contractor's view is connected to large costs, which arise when changes, risks or uncertainties occur, and therefore, being able to either proactive or rapidly handle these issues together are crucial. Moreover, the client wants a close collaboration to easier be involved in the project and thereby having the possibility to influence the project's proceedings. Since large infrastructure projects often affect many citizens, there are usually strong opinions that the governmental client needs to handle and therefore asks for a close collaboration with the contractor. All contractor respondents shared the view that a close collaboration is needed and some of them expressed an opinion that they lack in experience and understanding about the client's work, especially regarding long processes like environmental investigations that are performed even before the contractor is procured. The project director with the non-traditional background that was interviewed had previously worked in a similar position representing the client, and emphasized that this has been helpful in the position as project director at the contractor, especially in negotiations with the client. This experience was beneficial in a communication perspective, which is stated in the theoretical framework as vital for a project manager. The question is, where does a

person gets most appropriate training for these situations? The client relationship is mentioned in the theoretical framework as an important part in construction projects and it seems only to become more important as the projects gets bigger and more complex. Yu et al (2006) also state that it puts even more pressure on the contractor if the client is inexperienced, which is an extra challenge for the project director to manage.

Ultimately, the project directors have broadly described their roles as a project manager rather than a site manager according to the theoretical framework. One of the respondent could be viewed as a site manager according to the organization chart, and because almost all activities was connected to that project director in some way. The project director was in charge of the design, production, administration, financials, contact with client as well as sub-contractors. This is similar to how Farrell & Gale (2003) describe the site manager in the literature. However, this respondent was the one that stressed the importance of working with soft skills rather than hard skills the most. In addition, it should be highlighted that the project director had a huge workload and worked many extra hours every week.

5.3 How does the project director's role differentiate from the site manager's role?

Project director can be seen as one of the natural career steps for a talented site manager. Being a site manager is a logical step in training to become a project director. A site manager works with many activities that are similar to a project director, above all, the experience of having the ultimate responsibility and answering to the client, the parent organization, and sub-contractors. In addition, gaining experience of what is possible to do with a small budget, construction risk management, safety work et cetera are considered as beneficial. The site manager does usually have the BAS-U responsibility where he/she has personally responsible for the work environment (Ganahed & Otter, 2013). In the interview study, all project directors except one have not had the BAS-U responsibility. However, it is still the project director that is the outmost manager, and as one respondent mentioned, it is the project director one chase when something occur at the construction site. For instance, when technical issues occur that can jeopardize the complete project, or in case of lethal accidents. Even if the project director does not have the legal responsibility, the project director is the foremost project leader and thereby sets the project's culture. The construction industry is currently working intensely with safety work and it is something that almost all interviewees have stressed that a project director never can neglect.

In the interviews, the respondents stressed the importance of organization skills, structuring the temporary project organization, and the need of standardized procedures regarding quality, safety and the excessive documentation that large projects encompass. Summarized, the project director needs to be a person that is proactive and has the ability to delegate. In the theoretical framework, the site manager is described according to Styhre (2011) as a person that has complete control and always on the move to deal and solve arising problems. It is also expected that the site manager is familiar with and understands all activities at the construction site. As the problem-solver the site manager needs to be, one is usually reactive rather than proactive, and earlier research imply that site managers have issues with delegation

because since they are main responsible for their projects. One can therefore question if all site managers are suited for the role as a project director.

Styhre & Josephsson (2006) stated that a site manager must be a generalist in higher degree than other middle managers in other industries since the site manager is responsible not only for the day-to-day production but as well HRM, legal matter et cetera. In the interviews, the respondents had difficulties in giving concrete examples of their working duties, they were usually included in all parts of the project in some ways. The project directors must consequently be generalists like the site manager and this phenomenon can be seen as two sides of the same coin. In this context, it is two different types of generalists. The site manager needs to be a "practical" generalist since the site manager executes all these activities, and therefore the site manager needs to have enough production knowledge/competence. A project director on the contrary is supposed to have specific "departments" that handle issues such as HRM, financial, design et cetera. Hence, the project director needs enough understanding of these areas, but foremost the person must be able to coordinate the different departments and rapidly be up to date if the project director needs to be involved in greater part. For instance, if financials have issues that will influence the project and therefore needs to be communicated to the client or parent company. Styhre & Josephsson (2006) continue that most site managers prioritize the production above administrative matters since they usually appreciate those working duties in greater extent and are usually better at it. The production is the core business in a large infrastructure project, but a project director should not prioritize the production in front of other matters, naturally depending upon the organization structure. In most cases, there are a specific manager engaged for the production and several block managers that should handle and be empowered with issues regarding the production.

5.3.1 Business-sense – the most desirable attribute according to the survey

In contrary to the description of the site manager, a project director rather focus on proactive strategic management and decentralized decision-making in the organization. When asked to pinpoint the most desirable attributes for a project director in the conducted survey, one competence that scored the top three was the ability to delegate and coach, which previously been mentioned. The additionally two competences that scored the most answers were good leadership skills (later discussed in *"5.3.2 Leadership prioritizing soft skills"*) and business-sense. As mentioned, the survey was inspired by Josephson et al (2013), and if comparing the results, there is one distinct difference. One competence that all of the responding project directors shared is business-sense, hence business-sense is considered of high importance for a project director, which can be compared to the survey performed by Josephson et al (2013) where the site managers considered business-sense as the second least desirable out of 18 competencies. There are several potential explanations to this. According to Bentley (2009), one of the five main characteristics is that a project is temporary. Large complex infrastructure projects are temporary, but the long construction time almost indicates that the projects are of a more fixed nature, with continuously contact with the client. The relationship almost turns into a long-term relationship. In addition, large complex infrastructure projects includes large budgets that put entire companies at risk if failing. In order to perform a successful project in relation to the Triple Constraints Triangle model presented by Saladis & Kerzner

(2009), business-sense is important for the project director, especially for achieving a positive outcome of the budget. This is strengthened by the interview study where several respondents stressed the importance of doing good business and to not get fooled by huge numbers in the budget. However, one can question if the traditional background is necessary for being a good negotiator. The non-traditional project director emphasized that the experiences from working at the client facilitates for negotiating with the client. If having a background at the client, one know what the client wants to hear and how they most probably will value different aspects, which will facilitate for the project director to argue in a way that benefits the contractor and the project. The importance of business-sense is most likely connected to the relationship with the client where on-going negotiations are a recurring ingredient throughput a construction project. However, looking at alternative backgrounds that favours doing good business might be necessary since the project budgets seem to increase even more in the future.

5.3.2 Leadership prioritizing soft skills

The results in this thesis show that a project director main working tasks are related to human and organizational factors. As one of the respondents pointed out, the industry is in a construction boom and it is easy for co-workers to change employer and project. It is also common in the industry that if one middle manager moves, his or hers subordinates follow, which could be crucial for a large project to lose a key figure and then its subordinates. Therefore, one can argue that the current construction boom contributes for putting even more emphasis on working with soft skills to ensure pleased co-workers and consistent project teams that will last throughout the entire construction time. In Figure 4.2, a schematic organization chart is presented for a large infrastructure project, which shows how a project director leads departments similar to a higher manager in a company rather than a handful of persons. The project director needs to lead through others in order to achieve the project's objectives. The respondents have pointed out that they work as supportive function for colleagues and that coaching is an important part of their working day. This complies with what El-Sayegh (2016) stressed in section "*2.3.1 The need of creating an organization chart*", where the author pointed out the importance of a well-designed project organization in order to secure project success as well as the importance of delegation of authority and mandate within the organization. Many of the above mentioned factors indicate that a project director needs to work with several soft skills in order to deliver a project successfully.

In current literature, the site manager is described as a problem-solver, which the industry also demands now. The site managers are usually included in all activities at the construction site, and as Olsson & Westblom (2015) point out, the site managers tend to get stuck in their own bubble. The narrowness causes difficulties in delegating decision rights, but the difficulty also derives from that site managers have the final responsibility of a project. The role of being a project director is the opposite of being a site manager when it comes to this narrowness. Instead of keeping everything to oneself, the project directors emphasize the need of delegating responsibility, and present this as a vital part of their leadership. Summarized, one can state that there is a transformation between the two roles. Site managers rather focus on practical building skills and results, hence hard skills are favoured, while project directors prioritize soft skills with emphasis on creating a joint project team with shared objectives.

5.4 What implications for the project organization would a non-traditional project director imply?

The way a temporary construction project is organized has lately transformed for large infrastructure projects. Instead of having a site manager main responsible for a project, the organization structure of large infrastructure projects often includes two roles sharing the responsibility in a four-leaf clover organization, where the production responsibility is disconnected from the role of the project director. According to the interviewees, the decisive reason for this transformation is the growing complexity of large infrastructure projects. Gidado (1996) points out that the complexity due to constant uncertainty causes a need of specialized knowledge for performing a construction project. In large projects the demand of specialized competencies is even more, which in turn implies a larger organization that needs to be managed. Additionally, El-Sayegh et al (2016) argue that the involvement of external parts not included in the own organization contribute to an increased need for skills related to organizational structure for the project director. Instead of focusing on production activities the project director needs to put emphasis on designing a well-functioning project organization, which Pugh (1984) describes as outlining the responsibilities of roles in the project, how work is delegated, controlled and coordinated. One can argue that it is not up to the project director to have necessary knowledge of all activities, but rather to implement a well-functioning organization structure and project team with clear roles that have the proper competence. Large complex infrastructure projects have grown in size so it is not possible for the project director to know everything, and focus must be on delegating responsibility and decision rights throughout the organization. Respondent #1 highlighted this situation by the following quote: "*I cannot have special competence in all parts, I must trust that I have the competencies in my support functions.*"

5.4.1 The benefits of having a dynamic top management

There is a distinct differentiation of the roles as project director and production manager. As mentioned by the respondents, the disconnection from the day-to-day production implies that the project director does not have to be involved in every activity, focus is rather on strategic management and administrative work tasks. Because of this transformation of the role, it can be questioned if the project director needs to have production knowledge as the role indicates working towards a longer time horizon, as well as if the traditional site manager is best suited for the role. Farrell & Gale (2003, p.183) describes the role of the site manager as "*...being in charge of production and administration: directing, supervising and controlling the work of operatives; also coordinating the work of subcontractors and liaising with the client, consultants and third parties.*" Based on this description, it can be argued that the role as a site manager can be a proper preparatory role that creates suitable preconditions for developing the skills needed as a project director. However, Styhre (2011) describes the site manager more as a problem-solver involved in each and every activity on site, which is not in line with how the respondents describes the work tasks of the project director where they highlight the importance of not being involved in details and delegating work tasks within the organization. Because of the differences of the two roles, it is important to consider the dynamic of the top management of the temporary organization. Having a project manager and a production manager with similar backgrounds and work experience can imply that

some extent of group thinking can occur for the top management, with the result of having a narrow focus limited to focus on production only. It can be beneficial to appoint a project director with a non-traditional background as it enhances opportunities for a better dynamic of the top management in the project, which in turn can create opportunities for a broader perspective of foreseeing potential issues, as well as the project director will not interfere with the role of the production manager.

5.4.2 Mixing inexperience with experience within the organization

By appointing a project director that has not climbed the career latter the traditional way lacking of production-related experience would however affect the design and add additional requirements on the project organization. A main concern expressed by the respondents is how to support key roles in the organization when lacking of production experience. Without production-related experience it is hard to understand situations other roles are in, and hard to support colleagues when asked about how to solve potential issues related to the production. In addition, as strengthened both by the interviewees and the literature, the construction industry is more experienced-based than other industries due to the uncertainty and small amount of standardized processes, hence it can be argued that a non-production project director would have difficulties to gain internal trust and acceptance in decision-making since the credibility would be questioned. Bøllingtoft et al (2009) introduce the four organizational trade-offs as a guiding principle for how to design an organization where specialization is presented as one trade-off that needs to be balanced. Specialization does not necessarily have to imply specialized technical competencies but can also include balancing suitable profiles for specific roles in an organization. One way of shouldering the situation of a non-production project director would be to ensure that the production manager is highly experienced and has a lot of production-related knowledge to help the project director with these questions. However, here one can argue that it is up to the main organization to ensure that a proper organizational balance is achieved and suitable people with right competencies are appointed for executing large complex infrastructure projects. This however needs to be considered early on in the process, already in the tendering process since the key roles need to be presented when bidding for a project. It should be highlighted that problems might arise if all experienced production managers within the organization already are engaged to ongoing projects. In that case, maybe the organization should not bid for the specific project with a non-production project director from the beginning. It can also be mentioned that an unexperienced project director can imply decreased probability of winning a procurement due to the fact that that the person for the role as a project director would probably score a low score in relation to the predetermined qualities needed for the role that are stated by the client before the procurement.

5.4.3 Dealing with external trust

One thing that all respondent stress is the importance of the relationship with the client. Yu et al (2006) highlight that it is paramount for the contractor to identify and understand the actual needs and requirements of the client. In addition, one representative of the client states that the risks of the contractor is the risks of the client, and advocates a tight transparent collaboration. The collaboration with the client is even more important in large infrastructure projects, partly because the large

economical risks, but also because large infrastructure projects tend to affect lots of stakeholders (Chan et al, 2004; Szentes & Eriksson, 2013). The collaboration is often characterized by continuous meetings between the project director of the contractor and his/her counterpart at the client. According to the interview study, these meetings often revolve around disagreements regarding how the different parts interpret the contract. If the project director is unexperienced this might lead to inadequate collaboration, especially if the project director lacks of ability to discuss issues regarding the production. Without the experience, it can also be hard for the client to have trust for the project director, which in turn will harm the transparency of the collaboration since the client always will be suspicious. At the same time, if the client not fully trusts the project director, one can assume that the client's trust for the contractor's organization as a whole outbalances potential trust issues. One way of solving potential trust issues, as suggested by two interviewees, would for the project director be to bring relevant knowledge to these meetings in terms of the production manager, financial accountant, design manager, and sometimes even have block managers on hold by phone. However, all solutions have their pros and cons and comes at the expense of something else. Bringing additional roles with relevant knowledge is beneficial in respects of that more detailed questions can be discussed, and more decisions can instantly be taken during the meetings, and the client might feel that the contractor is taking their concerns serious. However, one implication of bringing more people would be that project driven roles likes the production managers and block managers are distant from the production. If questions arise that are crucial for the day-to-day production, chances are that the production then would hamper from the non-present project driven roles. In that case, this distance would then require clearly pinpointed responsibilities in the organization structure for who that has the authority of taking decisions in the meantime of the meetings with the client. But at the same time, the project driven roles are not always present in the production, and as Jensen & Meckling (1992) point out, decentralization is needed for taking correct actions, and the skilled workers that have production-related knowledge can be assumed to solve erupting issues on site best way possible. In addition, Alonso et al (2008) strengthen that decentralization is to prefer for large organizations when coordination is important as the case is for large infrastructure projects with a large amount of involved parts. The decentralization of decision-making facilitates for taking adequate decisions based on relevant knowledge, and a well-organized organization structure maximizes probabilities of doing so. It also enables for the project director to focus on being an aggregator spreading information and work with the strategic management, as well as the skilled workers can focus on their work tasks that are important for the progress of the project. Therefore, it can be argued that the project director does not necessarily need production-related experience, but rather insights for the construction industry in general.

5.4.4 Chinese whispers - 'lost in translation'

Most of the interviewees mean that there is a more bureaucratic way of working in large infrastructure projects, which especially Respondent #5 addressed in the interview study, "*The larger the project, the more careful you have to be with creating the playfield because you do not have the same closeness to the production.*" As mentioned in previous paragraph, the bureaucratic approach requires decentralized decision-making for taking correct actions and for being flexible. This in turn, puts more pressure on a well-functioning communication chart in the project, which the

bureaucratic approach facilitates for. Even though the project director has lots of experiences from working in the production, all relevant information will not reach the project director since relevant information will be lost because of Chinese whispers. According to Martin et al (2014), there is a chance that project directors will struggle with losing control of their projects due to poor communication. This could be extra challenging for unexperienced project directors who might have a harder time to assimilate information concerning the production. It can also be hard for them to know where to search for specific production knowledge, which can be time-consuming, frustrating, and involve unnecessary work. As several respondents pointed out, the distance from the production implicates that the project director has to work proactively with being more perceptive in large infrastructure projects, and extra focus must be on establishing clear communication paths. One way of doing so is to appoint an additional role that is responsible for the communication in the project in order to assure that communication paths are adequate and being updated as the project goes on. However, that might be needed even though the project director has a traditional background. Summarized, a non-productive project director might work even more with developing a systematic communication chart because of the lack of production experience. This would not only ensure that the project director gets updated with relevant information, but also favour all involved parts as clear communication paths are developed, which would benefit the project as a whole. In addition, a large complex infrastructure project encompasses a lot of people that need to be coordinated, and by putting more effort on developing the communication chart this coordination is reached, so appointing an unexperienced project director can be considered to be a win-win situation in terms of communication and coordination.

6 CONCLUSIONS

This final chapter aims to present the concluding remarks based on the analysis of this master thesis. The chapter will be divided in three main categories with the purpose of answering the main research question of this master thesis. Finally, recommendations for further research will be presented.

The success of a large infrastructure project is dependent on the project director's abilities of being in charge of the strategic management, structuring the project organization, collaborate with the client, communicate relevant information throughout the entire organization, and foremost, being a leader and create a joint team that works towards a common objective. However, despite the importance of the role to accomplish project success, present literature encompasses a rather small amount of research regarding the role of the project director in large infrastructure projects. The research about large infrastructure projects is related to mega projects in general and puts emphasis on the early stages of a project, hence the research regarding the topic of this thesis is rather unexplored and should be given more attention in order to ensure future successful large infrastructure projects.

6.1 Implications of the organization structure

Being promoted from site manager to project director is a natural career step and the site manager brings invaluable experiences from that occupation. The production is the core business in the project and being confident in this will give one natural authority and trust within the internal company and the client depending on previous projects. With a project organization, like figure 4.1, the conclusion is that the project director needs to have production experience. In those cases, experience is a crucial necessity since this position is quite alike the traditional site manager, where the role encompasses being involved in a large amount of activities directly related to the production. However, if the project organization is similar to figure 4.2, the authors see a possibility with a non-production experienced project director. In these cases, where an experienced production manager is included in the top management, the project director can broaden the total knowledge in the top management in the temporary project organization and focus on strategic management, the organization structure, and on being a leader creating a united project team. In addition, this organization structure can be beneficial for the project organization as a whole since experiences of the project director from other parts of the construction industry, or even experiences from other industries, may provide new insights and ways of working for developing and streamlining how a large construction project is performed. Despite that production-related experience might not be needed for the project director in a four-leaf clover organization, it should be highlighted that general construction knowledge is considered as a necessity for the role. This complies with the theoretical framework regarding that a project manager needs some technical knowledge and an awareness of the product-oriented processes (El-Sabaa, 2001; Katz, 1991; Meredith et al, 1995). However, what product-oriented processes means has in this thesis been summarized to understanding the construction industry and its processes, and how the processes are related rather than profound knowledge in concrete, installation, geotechnics or steelwork. Furthermore, it can be conducted that the Swedish construction industry will face a future with even larger complex infrastructure projects (Kungl. Ingenjörsvetenskapsakademien (IVA), 2016; Prop.

2016/17:21). Therefore, there will be an increased need of more diverse roles in the project top management that will require different competences, and most likely the role of the project director will transform into focusing even more on the strategic management.

It should be highlighted that appointing a non-traditional project director will result in some adjustments of the organization. The role of supporting the production key roles must be disintegrated from the project director. Instead a horizontal support function must be prioritized where the production managers and block managers take advantage of their different production skills form their various disciplines. In turn, this would force the block managers to work and collaborate more tight, which could lead to a raised awareness of positive chain effects across the disciplines.

Another organizational adjustment would be how to deal with centralized vs decentralized decision-making. There is already a tendency that there are projects within a project, meaning that block managers are delegated decision-rights so they can be in charge of their own "projects" within the main project. The decentralized decision-making would most probably increase if appointing an non-traditional project director, and disconnect the project director even more from the day-to-day production. However, this does not necessarily need to be negative. Specialization is one of four trade-offs that needs to be balanced when structuring an organization (Bøllingtoft et al, 2009). A large infrastructure project is complex and includes a large amount of specialists, and decentralized decision-making is paramount for dealing with instant problem-solving (Dubois & Gadde, 2002). Additionally, an organization's performance is dependent on the collocation of decision-making authority with the knowledge important for those decisions (Alonso et al, 2008; Jens & Meckling, 1992). The need of an increased amount of decentralized decision-making would provide opportunities for concerned key roles that possess relevant information to take right decisions, which would benefit for the project as a whole. However, the drawback would be that the disconnection of the project director would require increased internal coordination by feedback, and a more reporting way of working (Bøllingtoft et al, 2009).

6.2 What to consider as important when appointing a project director

Working as a site manager can be seen as a natural role to develop the skills needed for working as a project director since the site manager works with many similar activities. However, the role as a project director requires some additional attributes, and focus is rather on strategic management, creating the organization of the project, and delegating work tasks, instead of being out managing the production. In order to obtain the right attributes for the project directors, it is paramount to advocate horizontal career opportunities. The implementation of horizontal career paths will keep the right competence within the right role, and facilitating for selecting the right project director with the right additional attributes.

When assigning a person in the role as a project director for a large infrastructure project, attributes such as business-sense, coordination, coaching leadership, and organization skills should be valued as important. Production-related skills would

obviously be of interest, but the skills of managing a project must be prioritized. In most cases, the project director is disconnected from the day-to-day production, and working tasks are rather focused towards a longer time horizon not related to the production, unless the production affects contractual forms. One can conclude that the role of the project director has transformed from being involved in each and every activity, to having a helicopter view with emphasis on steering the organization. The increased size of infrastructure projects has made it impossible for the project director to know everything, and focus must be on delegating responsibility and decision rights throughout the organization. Because of the increased size of infrastructure projects, organizations can include 100 white collar and 300 blue collar, hence these project organizations demand a higher degree of structure. Because of the involvement of so many people, the project director is a project leader rather than a production leader. Major challenges for project directors are to keep the organization together, establish shared common objectives, and adjusting the organization in relation to the progress of the project. Therefore, soft skills should be prioritized rather than hard skills when appointing a project director. The soft skills are important for the project director to create a joint team, lead people towards shared objectives, and coach people in order to reach goals instead of hands-on activity-based leadership. Additionally, it should be emphasized that a background from working at the client could be beneficial. All the respondents pinpointed that business-sense is desirable, and all the interviewees came back to the importance of establishing a well-functioning relationship with the client. These competences do not necessarily have to be developed by climbing the career ladder the traditional way, and experiences from representing the client could facilitate for understanding the role of the client and to gain external trust.

6.3 Future challenges for project directors and the construction industry in general

The fact that the construction industry is experience-based does not necessarily mean that experience is needed for performing the work tasks of a project director. However, the colleagues and the client are used to the experience-based construction industry. Therefore, appointing a non-production project director would imply challenges for the project director to gain internal as well as external trust and acceptance. In addition, an unexperienced project director would imply decreased probability of winning the project procurement since that person probably would score a low score for the role as the project director.

The construction industry is often accused of being conservative and backward thinking, and it can be conducted that this is considered to be the largest obstacle for development in general, and for appointing leading positions with alternative backgrounds in particular. Appointing key roles with alternative backgrounds would provide the industry with new insights, and inspiration for how to implement innovative solutions from other industries. However, there are several explanations why the construction industry advocates production experience. Construction projects are heavily influenced by uncertainty, everything revolve around a site-specific project-based activity, each project is unique, there is a lack of standardized processes compared to other industries, and the industry is a loosely coupled system relying on

key roles (Cox & Thompson, 1997; Dubois & Gadde, 2002; Shirazi et al, 1996). Because o this, the construction industry faces a lot of challenges keeping up with the development of other industries. In addition, the construction industry stands in front of a paradigm shift with growing infrastructure projects. The way Swedish infrastructure projects are organized today is sufficient enough at the moment, but the question is if it will be the most suitable solution in the future.

To overcome the challenges related to the need of experience, it is important to zoom out and see the bigger picture. The client sets the tone of the project already in the procurement phase when deciding on the set of requirements for the project. Already here, experience is beneficial for scoring a high score for the role of the project director, hence the Swedish Transport Administration is a brake block for organizational innovation. Just because a project director's previous project was successful does not guarantee that the specific project director is best suited for the job. Chances are that the project director was not good at all, but thanks to the rest of the project organization a successful project was achieved. The mind-set where experience is favoured needs to be changed. A more innovative approach most be promoted in order to prepare the corporations for future challenges. The question one has to asked oneself is if future projects should be dependent on a single project director that can be likened as a superhuman, or if future projects should be dependent on a well-developed industry with relevant tools and desirable competence located in the top management project team. To appoint a project director with long production experience climbing the career latter the traditional is an easy, short-term oriented solution that hampers organizational innovation for the industry, and does not prepare the construction industry for future challenges and new demands. Instead, a more long-term oriented approach must be promoted where the construction industry has to develop towards a more standardized industry with a well developed organization structure in order to secure successful large infrastructure projects. However, this is a tough challenge, and it will take time to change current attitudes within the industry.

6.4 Recommendations for future research

Based on this master thesis, it can be conducted that Swedish contractors probably will continue to internally appoint project directors with a traditional background for large infrastructure projects, mainly because of the present mind-set regarding the need of production experience. Therefore, the authors of this master thesis suggest that future research should focus on how the crucial competences needed for a project director in a large infrastructure project best can be developed, and what professional background that is the most beneficial for the role. It would also be interesting to examine how different project organizations are affecting the needed competences for the project director, and if joint ventures put any extra demands on the role.

7 REFERENCES

Alonso, R., Dessein, W., & Matouschek, N. (2008). When does coordination require centralization?. *The American economic review, 98*(1), 145-179.

Anantatmula, V. S. (2010). Project manager leadership role in improving project performance. *Engineering Management Journal, 22*(1), 13-22.

Archibald, R. D. (2003). *Managing high-technology programs and projects.* New York: John Wiley & Sons.

Badaway, M. *Developing Managerial Skills in Scientists and Engineers.* New York: Van Nostrand Reinold, 1982.

Bentley, C. (2009) *The Essence of the PRINCE2: Project Management Method*. Hampshire Training Consultants, 7th Edition.

Bryde, D. J., & Robinson, L. (2005). Client versus contractor perspectives on project success criteria. *International Journal of project management, 23*(8), 622-629.

Bryman, A., Bell, E., (2003). *Business research methods*. Oxford: Oxford University Press.

Byggcheferna. (2015). Brist på platschefer flaskhals för nybyggnation. Collected 2017-05-24, from http://www.byggcheferna.se/2015/01/08/brist-pa-platschefer-flaskhals-for-nybyggnation/

Bøllingtoft, A., Håkonsson, D. D., Nielsen, J. F., Snow, C. C., & Ulhøi, J. P. (2009). New Approaches to Organization Design.

Chan, A. P., Scott, D., & Chan, A. P. (2004). Factors affecting the success of a construction project. *Journal of construction engineering and management, 130*(1), 153-155.

Cox, R., & Goodman, C. S. (1956). Marketing of housebuilding materials. *The Journal of Marketing,* 36-61.

Cox, A., & Thompson, I. (1997). 'Fit for purpose' contractual relations: determining a theoretical framework for construction projects. *European journal of purchasing & supply management, 3*(3), 127-135.

Dubois, A., & Gadde, L. E. (2002). The construction industry as a loosely coupled system: implications for productivity and innovation. *Construction Management & Economics, 20*(7), 621-631.

Djebarni, R. (1996). The impact of stress in site management effectiveness. *Construction Management & Economics, 14*(4), 281-293.

Edum-Fotwe, F. T., & McCaffer, R. (2000). Developing project management competency: perspectives from the construction industry. *International Journal of Project Management, 18*(2), 111-124.

El-Sabaa, S. (2001). The skills and career path of an effective project manager. *International journal of project management, 19*(1), 1-7.

El-Sayegh, S. M., Kashif, M., Al Sharqawi, M., Nikoula, N., & Alhimairee, M. (2016). Significant Factors Affecting the Size and Structure of Project Organizations. In *Industrial Engineering, Management Science and Application (ICIMSA), 2016 International Conference on* (pp. 1-5). IEEE.

Farrell, P., & Gale, A. (2003, September). Career progression path as a determinant of site manager skills. In *19th Annual ARCOM Conference* (pp. 3-5).

Favié, R., & Maas, G. (2008). Ranking Construction project characteristics. *Accessed on, 11*(8), 2012.

Fraser, C. (2000). The influence of personal characteristics on effectiveness of construction site managers. *Construction Management & Economics, 18*(1), 29-36.

Ganehed, L., & Otter, A. (2013) *Platschefens roll och arbetsbelastning* (Bachelor's essay). Göteborg: Institutionen för bygg- och miljöteknik, Chalmers Tekniska Högskola

Gidado, K. I. (1996). Project complexity: The focal point of construction production planning. *Construction Management & Economics, 14*(3), 213-225.

Hare, B., & Cameron, I. (2011). Site manager safety training. Engineering, *Construction and Architectural Management, 18*(6), 568-578.

Hauschildt, J., Keim, G., & Medcof, J. W. (2000, September). Realistic criteria for project manager selection and development. Project Management Institute.

Hong, Y., & WM Chan, D. (2014). Research trend of joint ventures in construction: a two-decade taxonomic review. *Journal of facilities management, 12*(2), 118-141.

Josephson, P.E., Räisänen, C., Lindström, M., & Luvö, B. (2013) Sveriges bästa platschefer – verklighetens förnyare. Forskningsrapport. Stockholm: Sveriges Byggindustrier.

Jensen, M. C., & Meckling, W. H. (1992). Specific and general knowledge and organizational structure.

Katz, R. (1991). Skills of efective administer. *Harvard Business Review, Business Classics: Fifteen Key Concepts for Managerial Success.*

Kerzner, H. (2013). *Project management: a systems approach to planning, scheduling, and controlling.* John Wiley & Sons.

Kungl. Ingenjörsvetenskapsakademien (IVA). (2016). I*nfrastruktur En branschrapport: IVA-projektet Resurseffektiva affärsmodeller – stärkt konkurrenskraft.* Stockholm: Kungl. Ingenjörsvetenskapsakademin (IVA)

Lechler, T. (1997). Erfolgsfaktoren des Projektmanagements, 1997. *Erfolgsfaktoren des Projektmanagements, zugl. Dissertation,* Frankfurt/Main.

Le Duc, M. (2007). Metodhandbok som tankekarta. Mälardalens Högskola.

Lundvall, F., & Karlsson, D. (2012). *Produktionschefens arbetssituation: Hur deras arbete kan förändras och utvecklas* (Bachelor's essay). Halmstad: Sektionen för ekonomi och teknik, Högskolan i Halmstad

Löwstedt, M. (2017) *Hur sker förändring inom svensk byggbransch? En studie om initiativ, logiker, och roller.* Svenska Byggbranschens Utvecklingsfond (SBUF), Projekt-ID 12509.

Martin, H., Lewis, T. M., & Fifi, J. (2014). Centralized versus decentralized construction project structure–Easing communication difficulties. *International Journal of Construction Management, 14*(3), 156-170.

Meredith R, Posner BZ, Mantel SJ Jr. (1995). *Project management: a managerial approach*. New York: John Wiley

Nam, C. H., & Tatum, C. B. (1997). Leaders and champions for construction innovation. *Construction Management & Economics, 15*(3), 259-270.

Ó Conchúir, D. (2012) *Overview of the PMBOK Guide: paving the way for PMP certification*, 3rd Edition, Springer, New York, Heidelberg.

Olsson, S., & Westblom, E (2015). *Platschefens roll i planeringen: Hur produktionsplaneringen kan förbättras hos Byggmäster i Mälardalen AB.* (Bachelor's essay). Eskilstuna: Akademin för ekonomi, samhälle och teknik, Mälardalens högskola.

Posner, B. Z. (1987). What it takes to be a good project manager. *Project management journal, 18*(1), 51-54.

Project Management Institute. (2013) *A Guide to The Project Management Body of Knowledge, 5th Edition*, Newtown Square, PA: Project Management Institute.

Prop. 2016/17:21. *Infrastruktur för framtiden – innovativa lösningar för stärkt konkurrenskraft och hållbar utveckling*. Accessed: http://www.regeringen.se/rattsdokument/proposition/2016/10/prop.-20161721/

Pugh, D. S. (1984). *Organization theory: Selected readings.* Harmond-sworth: Penguin books.

Romans, D.D. (1985). Managing Projects: A Systems Perspective. New York: Elsevier Science Publishing

Rowlinson, S., Ho, T. K., & Po-Hung, Y. (1993). Leadership style of construction managers in Hong Kong. *Construction Management and Economics, 11*(6), 455-465.

Saladis, F.P., Kerzner, H. (2009) *Bringing the PMBOK guide to life: a companion for the practicing project manager*, John Wilney & Sons Inc, New Jersey.

Savin-Baden, M., & Major, C. H. (2013). *Qualitative Research: The Essential Guide to Theory and Practice*. London: Routledge.

Shirazi, B., Langford, D. A., & Rowlinson, S. M. (1996). Organizational structures in the construction industry. *Construction Management & Economics*, 14(3), 199-212.

Seymour, T., Hussein, S. (2014) The History Of Project Management, *International Journal of Management and Information Systems*, vol. 18, no. 4, pp. 233.

Simu, K. (2009). *The construction site manager's impact on risk management performance* (Doctoral dissertation, Luleå tekniska universitet).

Styhre, A. (2006). The bureaucratization of the project manager function: The case of the construction industry. *International Journal of Project Management, 24*(3), 271-276.

Styhre, A., & Josephson, P. E. (2006). Revisiting site manager work: stuck in the middle?. *Construction Management and Economics, 24*(5), 521-528.

Styhre, A. (2011). The overworked site manager: gendered ideologies in the construction industry. *Construction Management and Economics, 29*(9), 943-955.

Styhre, A. (2012). Leadership as muddling through: site managers in the construction industry. *In the Work of Managers: Towards a Practice Theory of Management, Oxford University Press, Oxford and New York,* 131-45.

Svennevig, J. (2001). Abduction as a methodological approach to the study of spoken interaction. *Norskrift, 103,* 1-22.

Sveriges Byggindustrier. (2003). *Infrastruktur och ekonomisk tillväxt.* Stockholm Sveriges Byggindustrier

Szentes, H., & Eriksson, P. E. (2013). Societal changes and new conditions for the management of large construction projects. *Open Construction and Building Technology Journal, 7,* 182-192.

Szentes, H., & Eriksson, P. E. (2014). Organisering och ledning av stora byggprojekt: Slutrapport för SBUF-projektet: 12451.

Trafikanalys. (2011). *Transportsystemets tillstånd, utmaningar och möjligheter - en nulägesanalys (Rapport 2011:10).* Stockholm: Trafikanalys

Turner, J. R., & Müller, R. (2003). On the nature of the project as a temporary organization. *International journal of project management, 21*(1), 1-8.

Yu, A. T., Shen, Q., Kelly, J., & Hunter, K. (2006). Investigation of critical success factors in construction project briefing by way of content analysis. *Journal of Construction Engineering and management, 132*(11), 1178-1186.

7.1 Picture reference

Posner, B. Z. (1987). What it takes to be a good project manager. *Project management journal, 18*(1), 51-54.

Project Management Institute. (2013) *A Guide to The Project Management Body of Knowledge, 5th Edition*, Newtown Square, PA: Project Management Institute.

APPENDICES

Appendix I – Questions to contractor respondents

Background questions
Describe your career path. What is your professional background?

Can you describe your project? Contracts, budget, organization et cetera.

Overall questions
Tell us about you and your career path to this position today.
- Why has specifically YOU ended up in this position?

Can you describe a normal working day? (Week/month/year)
- Everyday thresholds/obstacles?

What do you appreciate most in your role as a project director?

Competence need for a manager in a large project
What is different in the way to work as site manager in a large project?

What parts from your career path, do you get use from in your current role?

How would you describe your role in the project?
- How do you work to push the project forwardly?
- Link between project driven roles?

What competencies are crucial in your position for leading a large project?
- Is it complete different competencies that are needed in a large project compared to a traditional project?
- Does the role change or is it just more of everything?
- Production-based problem solving versus coordination?

What is the biggest challenge for you as responsible manager in order to deliver the project successfully?

What would you like to spend more time on in your role?
- Why?
- How would it affect the project's progression?

How much of your working day demands construction technical knowledge?
Production technical knowledge?
- Give examples on tasks where you have use of it?
- How do you have use of it?
  - What is the risk to appoint a site manager without experience from large projects?
  - What are the risks of appointing a site manager without construction technical knowledge?

How has the technological development affected the competence need in your role?

How is your role affected by the increased number of stakeholders?
- Reports/administrative work?
- Time?
- Meetings?
- Common goals/teambuilding (consults)?

Organization/Organization structure

How does a large project differ from a smaller project?

What was the decisive factors that made the organization structure be as it is in this project?

How does the organization structure affect your way of manage the project? What consequences?
- Bureaucracy?
- Control
- Delegation?

Do you consider yourself as a "corporate leader"? (Depends on the previous answers)

How do you deal with the "alpha-male" problem?

When are you involved in a block manager's work?

Closing questions

How do see on the future leader of large infrastructure projects?

Is there something that you want to add or that we have missed?

Thank you!

Appendix II – The client respondents

General questions
Describe your career path. What is your professional background?

Which projects are you currently involved in as STA project director ?

Collaboration with contractor's project director
How would you describe the contractor project director role?

What competences do you think that a project director needs in large infrastructure projects?

What is the optimal background a project director can have? (Career related)

What is your most important task in the project?

What is the counterpart's project director most important task according to you?

Where do you fail in cooperation with the contractor?

Where do the counterpart fail?

The literature says that one of the biggest reasons why projects do not succeed is because of conflicts between client and contactor:

What demands do you have on the project director?
How do you want the communication/cooperation to be organized?

What do you think a project manager at the contractor should spend more time with if you were able to control his or her existence to ensure a successful project?

Do you think project managers (Contractor) should do something different to promote successful collaboration?

What?

What are the major differences in the cooperation between the contractor and the client in large infrastructure projects versus smaller infrastructure projects?

Describe what we mean with the "traditional" career path
Can you describe five situations where it would be implications in the cooperation if the project director would lack the classical experience?

What do you most appreciate with a project manager for a successful project and collaboration?

What would the consequences be of appointing a project director without a production background?

Without construction industry background?
Without experience of large projects?

What benefits would you see with a project director with experience from other industries?

Evaluation of tender site manager/project director
What requirements did you have for the contractor's project director in the projects where you were project director?

Why did you have these requirements?

How "important" have they been?
How is it related to the project organization?

Closing questions
How do you look at future project directors for large infrastructure projects? Will the needed competences be different?

ECI?
Even larger projects?
JV/foreign actors?

Is it something that you want to add?

Thank you!

Appendix III – The survey

This is the survey template in Swedish with the final results.

Välj de sju främsta egenskaperna för en projektchef

Erfarenhet	**4**
Goda ledaregenskaper	**7**
Driven	**0**
Kommunikativ förmåga	**6**
Självgående	**1**
Engagerad	**4**
Samarbetsförmåga	**4**
Initiativförmåga	**0**
Serviceinriktad	**0**
Motivera personal	**2**
Affärsmässig	**9**
Fatta beslut	**6**
Strukturerad	**5**
God planerare (Prioritera, organisera)	**2**
Förtroendeingivande	**2**
Kunna delegera och coacha andra	**7**
Hög social kompetens	**1**
Ödmjuk	**1**
Konflikthantering	**2**
tekniskt/byggtekniskt kunnande	**0**